
Review of Information Technology in Virginia State Government

**Prepared by
Gartner Group Consulting Services
for the
Joint Legislative Audit and Review Commission of the
Virginia General Assembly**



Benchmark Detail

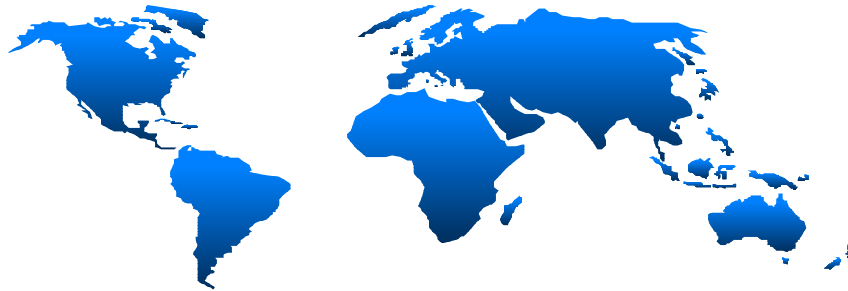
October 6, 1997

DIT Data Center



Virginia Department of Information Technology

Data Center Analysis



A Comparative Benchmark Annual Report

REALDECISIONS
A GARTNER GROUP COMPANY

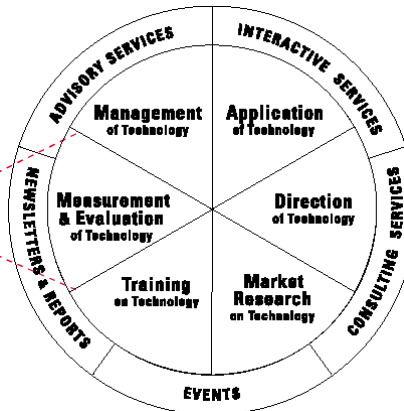
Meeting Agenda

- ◆ Introduction and Project Guidelines
- ◆ Summary of Overall Study Results
- ◆ Specific Areas of Review and Analysis
 - Annual Operating Expenditures
 - Staffing Levels and Costs
 - Customer Work Produced
- ◆ TOP Model Analysis
- ◆ Q & A

Gartner Group and Real Decisions Core Areas of IT Expertise

- ♦ By combining the expertise of both Gartner Group and Real Decisions, we are ready to serve your IT advisory needs for today and tomorrow.

Real Decisions' Continuous Improvement Services



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 3

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions Service Deliverables

Real Decisions services provide for continuous evaluation and improvement of IT contribution to your business



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 4

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Scope of Study

- ◆ Fiscal 1996 Data Center Efficiency Analysis
 - Study period from July 1995 through June 1996.
 - IBM & UNISYS mainframe environment.
 - Includes peripheral DASD, Tape Storage, and Print.
 - For comparison, the Virginia Department of Information Technology (DIT) weighted average capacities of 596 MIPS and 1.97 TB of DASD are used.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 5

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Profile of Comparison Groups

Detail

- ◆ Government
 - Seven installations with an installed MIPS size of between 301 and 673 MIPS. The average size is 454 MIPS.
 - There are three state governments represented.

Summary

- ◆ MIPS
 - Fourteen Installations with an average capacity of 597 MIPS
 - Two Government installations
- ◆ Best Standard of Efficiency (BSE)
 - Six installations with an average installed capacity of 611 MIPS.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 6

REAL DECISIONS
A GARTNER GROUP COMPANY

Best Standard of Efficiency

Criteria

Data centers performing general-purpose processing whose cost-efficiency rating places them among the top 10% performers in the RD database

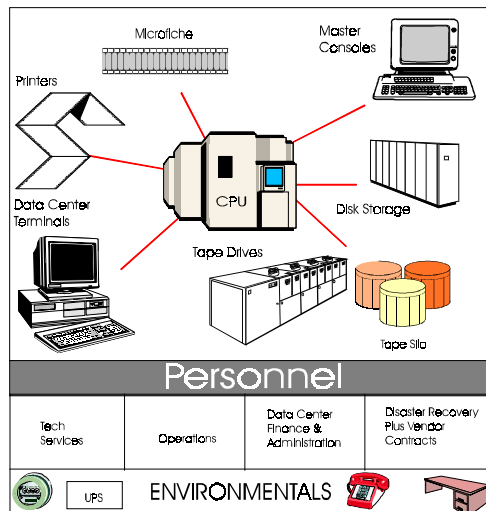
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 7

REAL DECISIONS
A GARTNER GROUP COMPANY

Consensus Data Center Model



Separate RD Components

NETWORK
NETWORK EQUIPMENT
FRONT END PROCESSORS
MULTIPLEXORS
MODEMS
PROTOCOL CONVERTERS
LANS/WORKSTATIONS
CIRCUITS

DEVELOPMENT
PERSONNEL
SOFTWARE TOOLS

SPECIAL
SUPERCOMPUTERS
MINICOMPUTERS
PERSONAL COMPUTERS
WORKSTATIONS

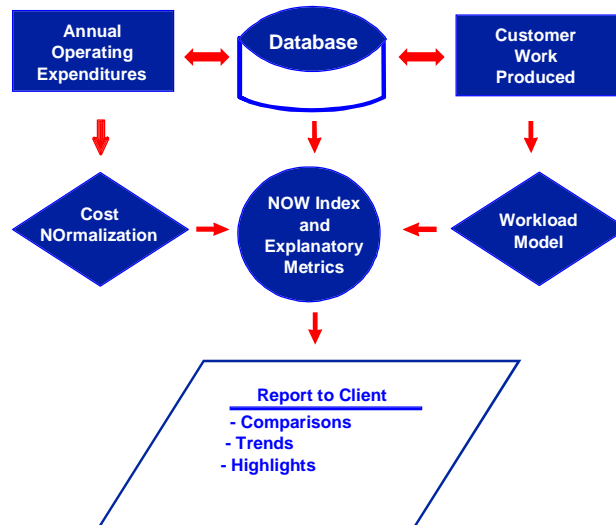
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 8

REAL DECISIONS
A GARTNER GROUP COMPANY

Overview: Data Center Evaluation



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 9

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Normalized Cost

Work Produced

A single index to measure, rate and compare
unit cost-efficiency across the database

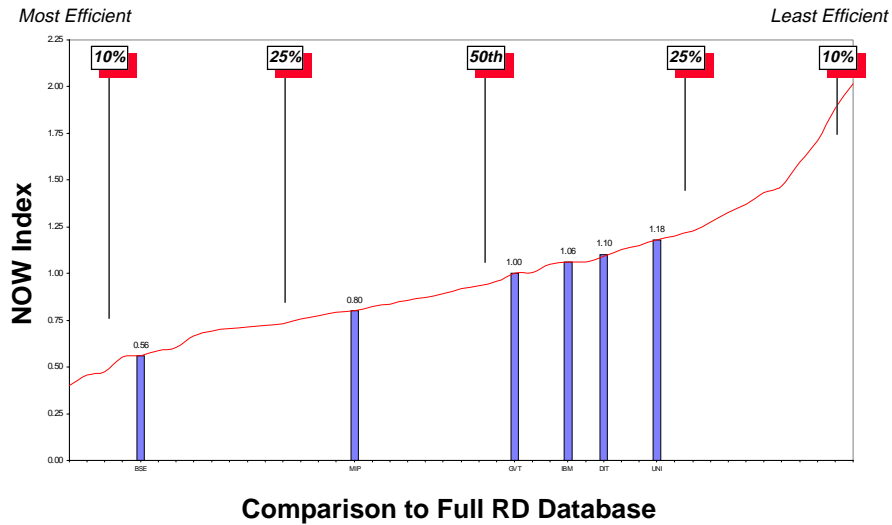
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 10

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



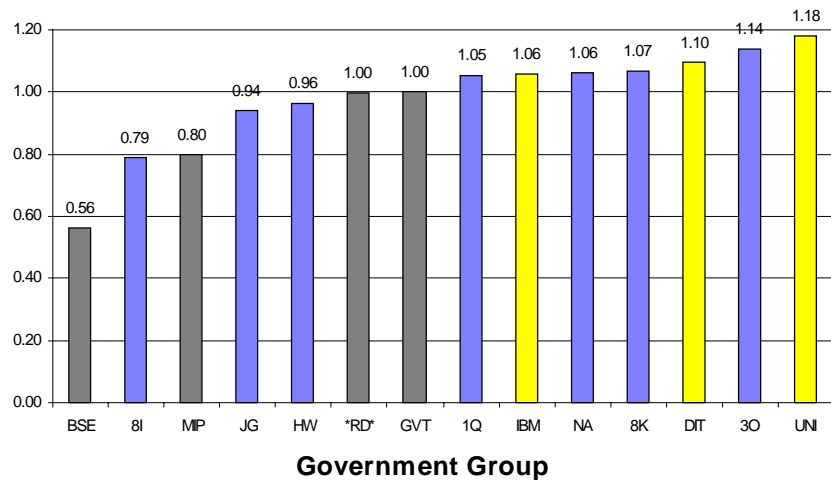
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 11

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



Virginia DIT

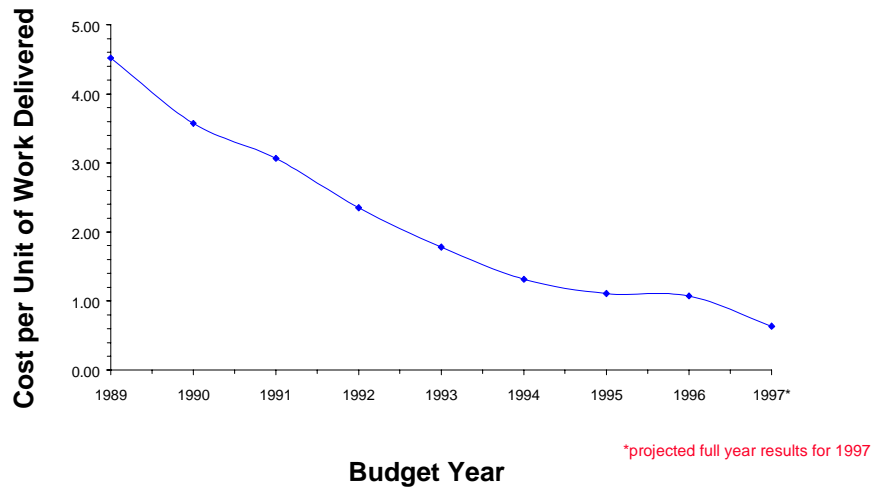
JLARC DRAFT—NOT APPROVED

Page 12

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Annual Decrease of 23%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 13

REAL DECISIONS
A GARTNER GROUP COMPANY

Results of Analysis

Overview

- ◆ For the study period, DIT overall data center spending per MIPS is 17% lower than the government peer group members on average.
- ◆ Total value of the work produced per MIPS is 22% lower than the government peer group.
- ◆ DIT has a slight advantage versus the current database which contains a majority of 1995 data. With an average database improvement of 20% per year, DIT compared to a 1996 data would result in an estimated NOW Index closer to 1.21.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 14

REAL DECISIONS
A GARTNER GROUP COMPANY

Detailed Comparison

- ◆ Annual Operating Expenditures
- ◆ Staffing
- ◆ Value of Work Produced

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 15

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

- ◆ “Consensus” Budget Model
- ◆ Standardized Cost Definition
- ◆ Categorization of Headcount and Costs

A rigorous cost normalization methodology used to establish a
“level playing field”

Virginia DIT

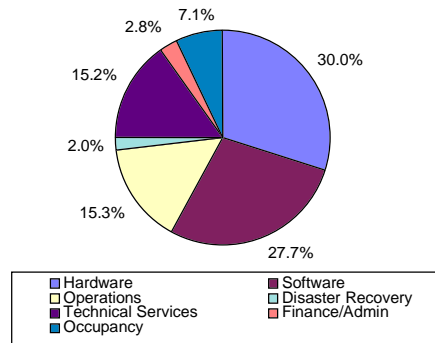
JLARC DRAFT—NOT APPROVED

Page 16

REAL DECISIONS
A GARTNER GROUP COMPANY

RD Budget Model (\$000)

Budget Category	Normalized Costs
Hardware	\$6,414
Software	\$5,907
Operations	\$3,275
Disaster Recovery	\$417
Technical Services	\$3,237
Finance/Admin	\$595
Occupancy	\$1,510
Total	\$21,355



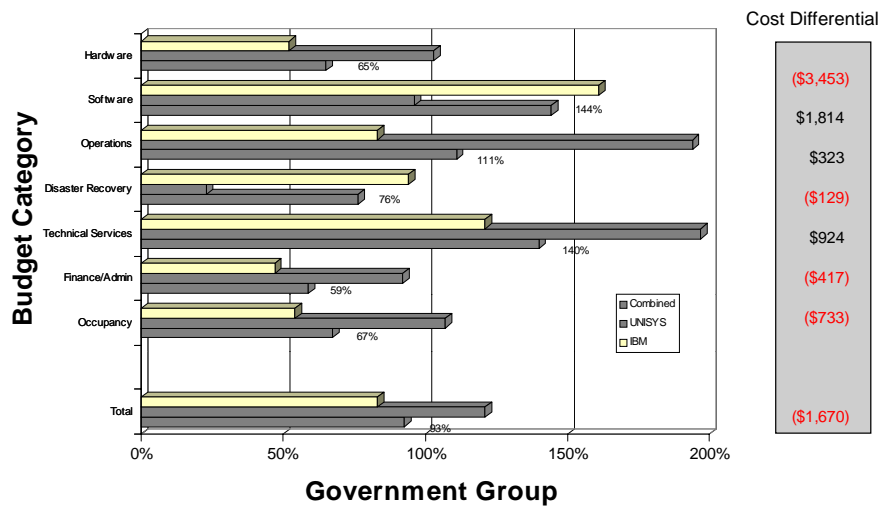
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 17

REAL DECISIONS
A GARTNER GROUP COMPANY

Cost per Installed MIPS (\$000)



Virginia DIT

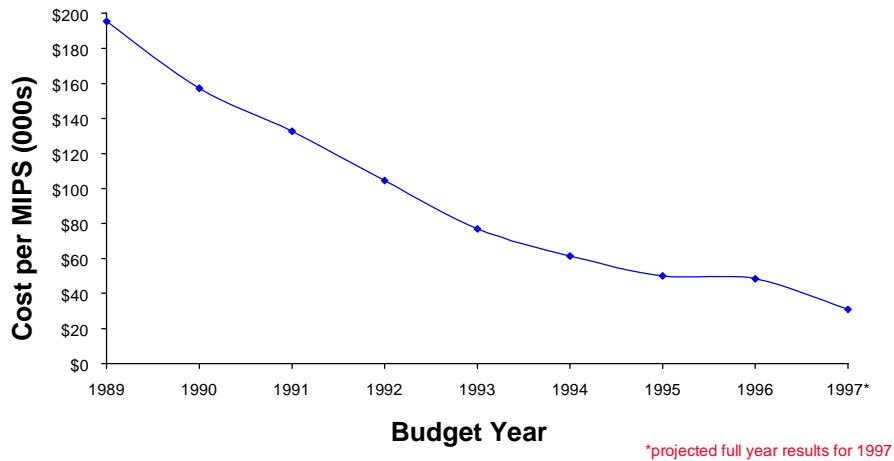
JLARC DRAFT—NOT APPROVED

Page 18

REAL DECISIONS
A GARTNER GROUP COMPANY

Total Cost per MIPS

Annual Decrease of 22%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 19

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Definitions

CPU—Processor complexes including processor unit, controllers, power & coolant units, power units plus upgrades, expanded storage changes, local and remote channel-to-channel adapters and coupling facility.

System Consoles—System operation consoles including master consoles and sub-system monitors, generally located in control room.

Disk Storage—All disk including 3380s, 3390s (or equivalents) but excluding optical disk or mass storage devices.

Tape Storage—Reel and cartridge drives, tape controllers, silos and automatic tape loaders.

Output Hardware—Printers, bursters, decollaters, roll paper feeds and microfiche equipment but excludes sorters or inserters.

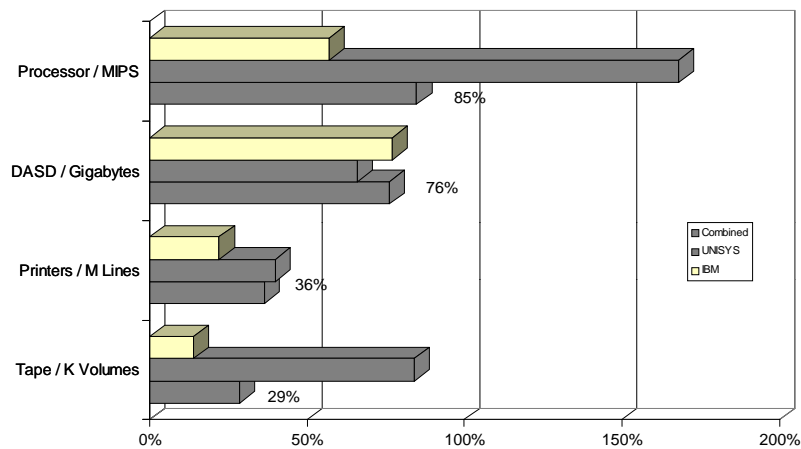
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 20

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Costs



Government Group

Virginia DIT

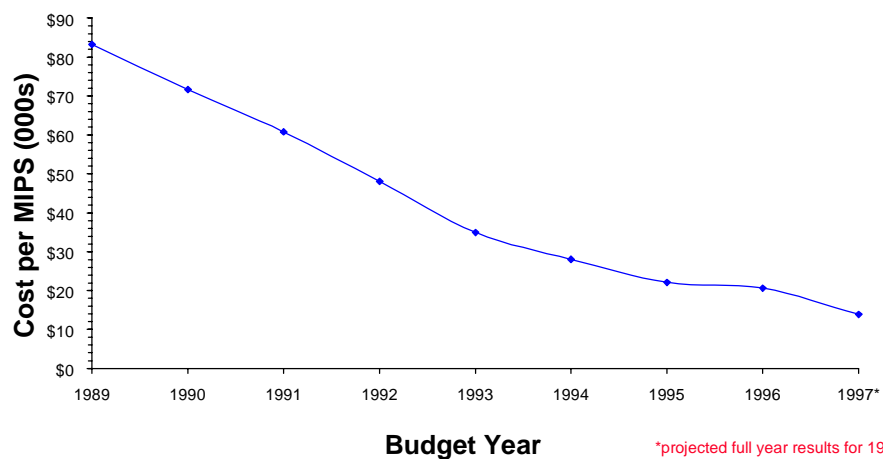
JLARC DRAFT—NOT APPROVED

Page 21

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Cost per MIPS

Annual Decrease of 21%



*projected full year results for 1997

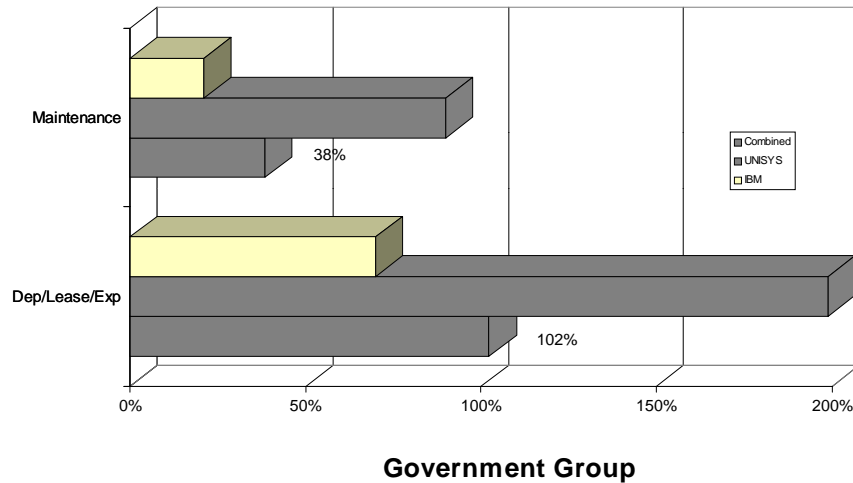
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 22

REAL DECISIONS
A GARTNER GROUP COMPANY

Processor Costs



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 23

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (30% of RD consensus budget)

- ◆ The cost per installed MIPS of \$10,760 is below all peer groups.
- ◆ IBM hardware cost per MIPS of \$8,630 is one half the per MIPS cost for the peer groups.
- ◆ UNISYS hardware costs per MIPS of \$17,090 is on par with the peer groups.
- ◆ IBM processor costs of \$4,588 per MIPS one half the peer groups and competitive with CMOS processor costs.
- ◆ UNISYS processor costs of \$13,619 per MIPS is much higher than the peer group averages and 68% higher than the government peer group average.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 24

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (Cont'd)

- ◆ DASD costs of \$1.85M for 1.97TB are 15% to 40% lower than the peer group averages.
- ◆ IBM DASD costs of \$1.68M for 1.77TB are 12% to 26% below the DASD costs for the peer groups.
- ◆ UNISYS DASD costs of \$166K for 204GB are lower than the per MB cost of IBM DASD and 25% to 35% below the peer group averages.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 25

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (Cont'd)

- ◆ Overall Tape costs of \$228K are 70% to 75% below the peer group averages while tape workload is 5% below the government peer group average and above the other peer groups.
 - IBM Tape costs of \$90K are 85% below the peer group averages while tape workload is 13% to 56% above the peer group averages.
 - UNISYS Tape costs of \$138K are 20% to 40% below the peer group averages and tape workload is 25% to 55% below the peer group averages.
- ◆ The low cost per tape volume indicates a high number of tape volumes and the opportunity to transition to automated storage management technology.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 26

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (Cont'd)

- ◆ Overall print costs of \$203K are 85% below the peer group averages. The print workload is 25% to 35% less than the peer groups. This in large part is due to on-line viewing and the DIT customer handling 90% of the print workload.
 - IBM print costs of \$24K is 3% of the peer group averages and is due to the bulk of the printing being done by the UNISYS.
 - UNISYS print costs are also low at \$179K. This is 40% to 65% of the peer group averages. This UNISYS print workload is 14% above the government peer group.
- ◆ The hardware cost per printed line is 45% to 55% of the peer groups.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 27

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Definitions

Operating System:

Change Management
Data Management
Output Management
Production Management
Security Management
System Management

Excluded Software:

Development
Network
Applications

Subsystem System:

4GL
3GL
Office Products

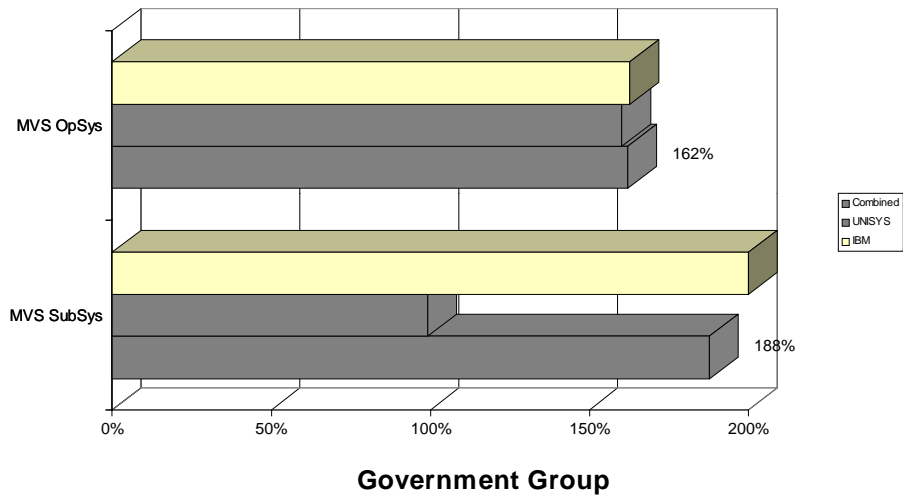
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 28

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Costs



Virginia DIT

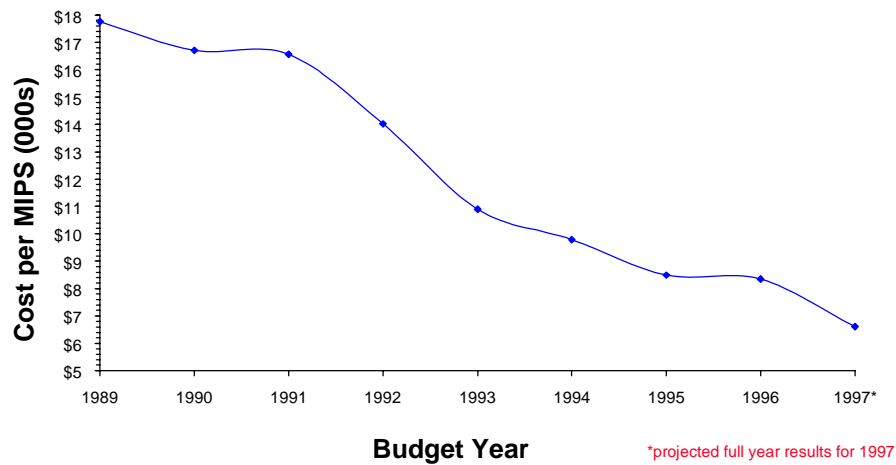
JLARC DRAFT—NOT APPROVED

Page 29

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Cost per MIPS

Annual Decrease of 12%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 30

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Software (28% of RD consensus budget)

- ♦ Software costs of \$6M are above all peer groups and 44% above the government peer group average.
- ♦ Software costs are higher in large part due to the multiple systems of MVS, VM and UNISYS, and the large software portfolio needed to meet customer requirements.
 - IBM software costs of \$5M are 61% higher than the government peer group.
 - UNISYS software costs of \$1M are on par with the government peer groups.

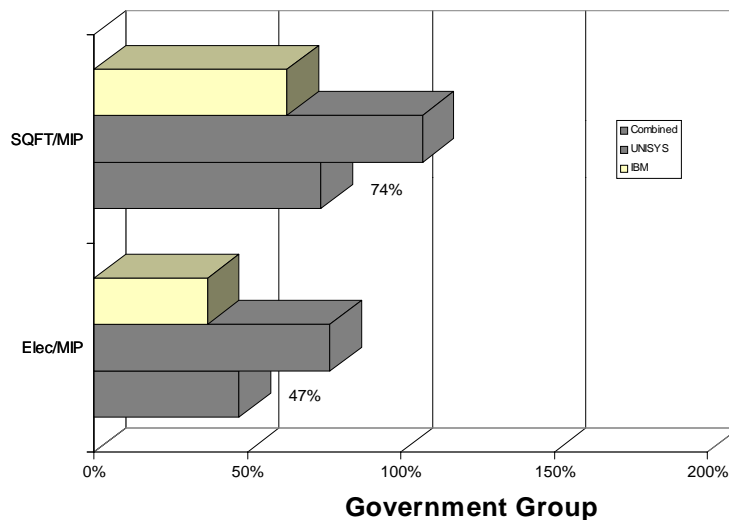
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 31

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Costs



Virginia DIT

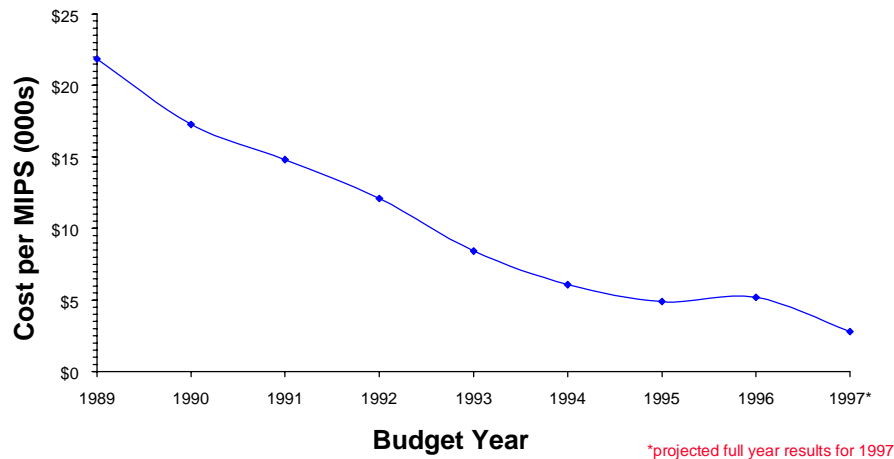
JLARC DRAFT—NOT APPROVED

Page 32

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Cost per MIPS

Annual Decrease of 23%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 33

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Occupancy (7% of RD consensus budget)

- ◆ Occupancy costs of \$1.5M are lower overall than the peer group averages due to less square feet per MIPS than the peer group averages. The higher infrastructure costs drive the total cost per square foot slightly above the peer group averages.
 - IBM costs of \$900K are well below the per group averages for similar CPU capacity.
 - UNISYS costs of \$600K are on par with the peer groups for similar CPU capacity.

Virginia DIT

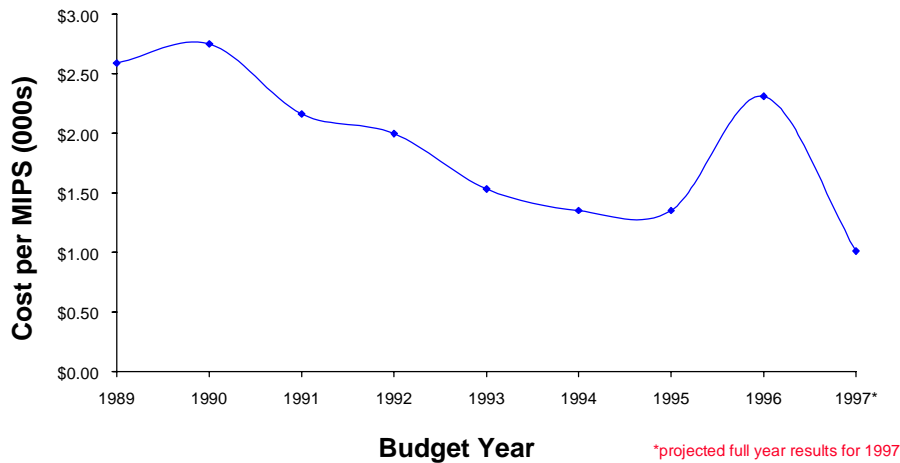
JLARC DRAFT—NOT APPROVED

Page 34

REAL DECISIONS
A GARTNER GROUP COMPANY

Disaster Recovery Cost per MIPS

Annual Decrease of 7%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 35

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Disaster Recovery (2% of RD consensus budget)

- ◆ Disaster Recovery costs of \$400K are lower overall than the peer group averages and 25% lower than the government peer group. This is due in large part to the lack of a vendor disaster recovery site for the UNISYS system.
- ◆ IBM cost of \$383K provides DR for 72% of the installed CPU capacity and 66% of the installed DASD capacity.
- ◆ The average installation in the database provides for 45% of the CPU capacity and 55% of the DASD capacity.

Virginia DIT

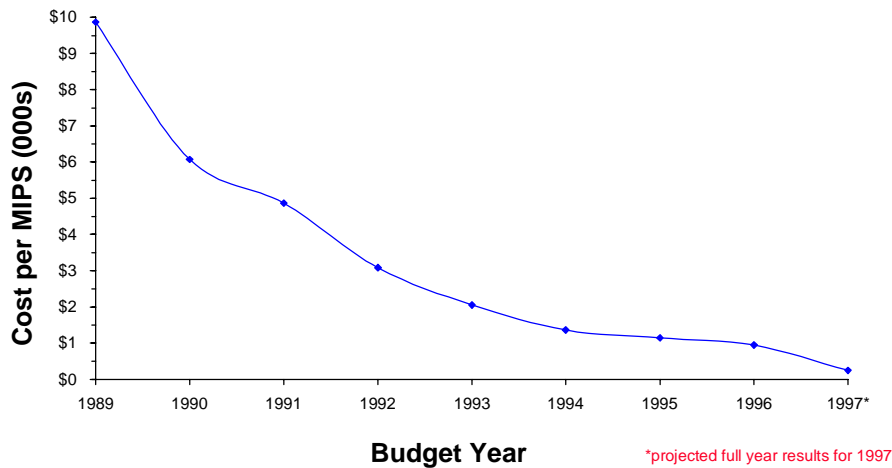
JLARC DRAFT—NOT APPROVED

Page 36

REAL DECISIONS
A GARTNER GROUP COMPANY

Finance/Admin Cost per MIPS

Annual Decrease of 32%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 37

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Financial/Admin (3% of RD consensus budget)

- ◆ Financial/Admin costs of \$600K are 40% below the government peer group but higher than the other peer group averages.
- ◆ IBM cost of \$360K are lower overall than the peer groups and one half of the government peer group.
- ◆ UNISYS cost of \$235K are on par with the government peer group and much higher than the other peer groups overall.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 38

REAL DECISIONS
A GARTNER GROUP COMPANY

Staffing Levels and Costs

- ◆ Staffing Categories
 - Operations
 - Technical Services
- ◆ Headcount and per-capita comparisons

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 39

REAL DECISIONS
A GARTNER GROUP COMPANY

Headcount Summary

Operations	DIT	Tech Services	DIT
Management	3.9	Management	4.4
Shift Ops	57.2	Sys Prog	25.9
Help Desk	4.2	Security	4.1
Output Serv	12.9	Perf Meas	11.4
Prod Control	3.2		
<hr/>		<hr/>	
Total	81.4	Total	45.8
<hr/>		<hr/>	
Cost/Person	\$40,233.24		\$70,677.14

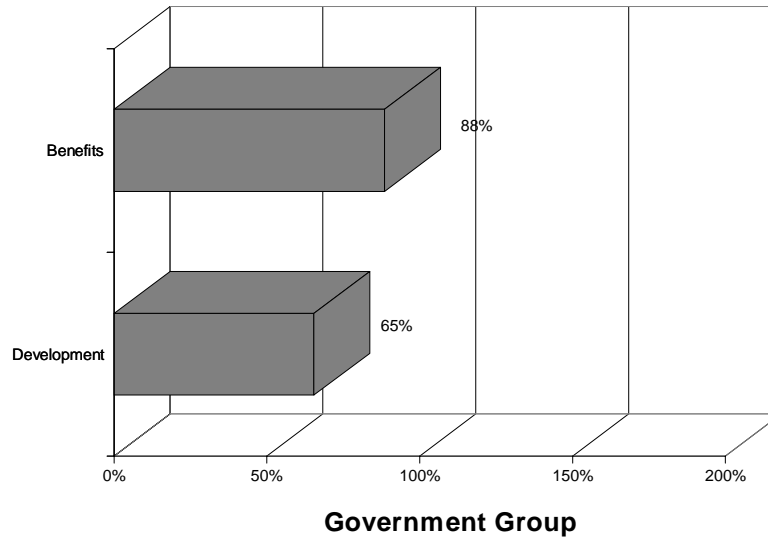
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 40

REAL DECISIONS
A GARTNER GROUP COMPANY

Compensation Analysis



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 41

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Operations

Management—(Managing three or more of the following functions)

Shift Operations

- System Operations
- Operations Support
- Tape Operations

Help Desk

Output Services

- Print Operations
- Fiche Operations

Production Control

Virginia DIT

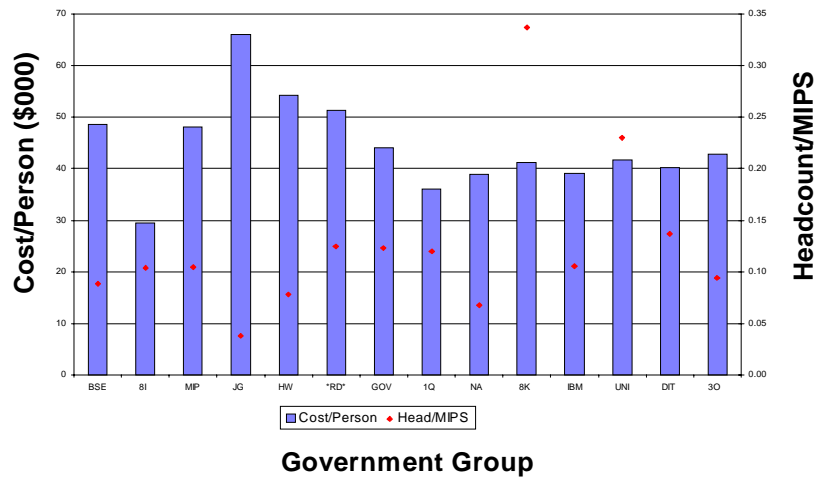
JLARC DRAFT—NOT APPROVED

Page 42

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Staff Comparison

Staffing Levels and Cost Per Person



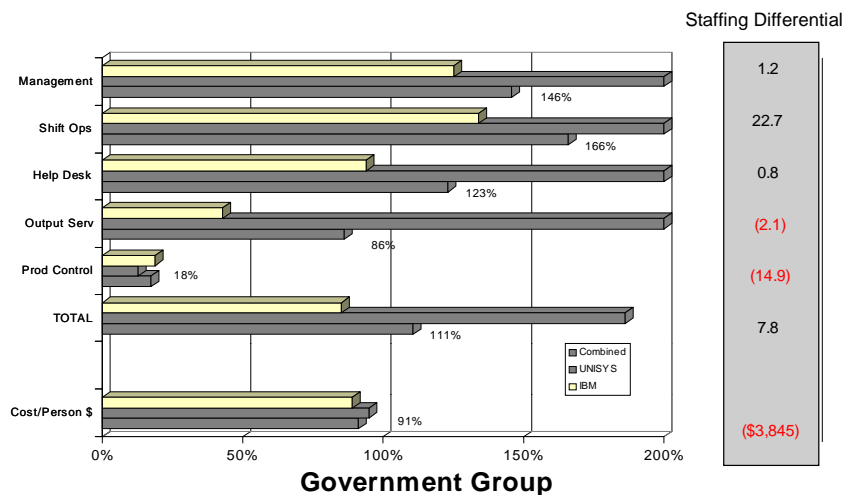
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 43

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Headcount per MIPS



Shift Ops: System Operations, Operations Support, Tape Operations

Output Serv: Print Operations, Fiche Operations

Virginia DIT

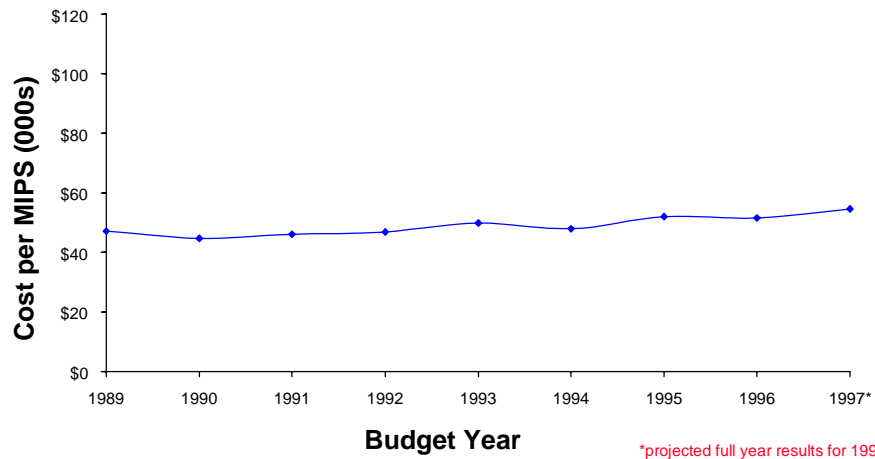
JLARC DRAFT—NOT APPROVED

Page 44

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per Head

Annual Increase of 2%



Virginia DIT

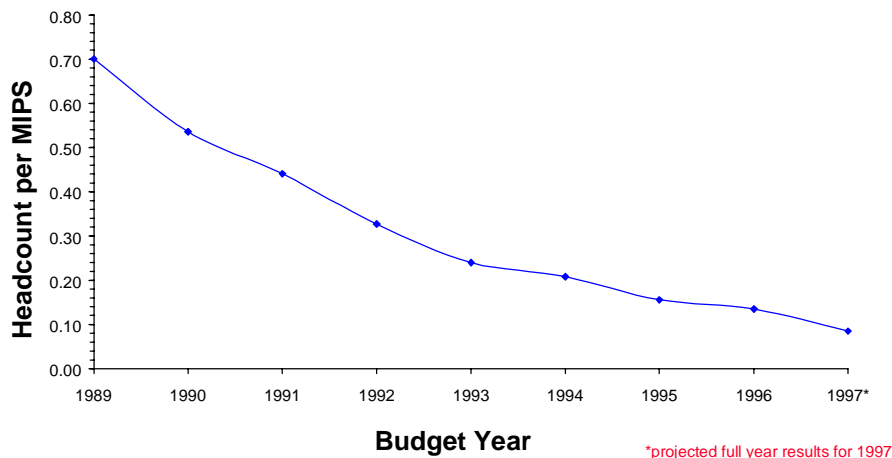
JLARC DRAFT—NOT APPROVED

Page 45

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Heads per MIPS

Annual Decrease of 26%



Virginia DIT

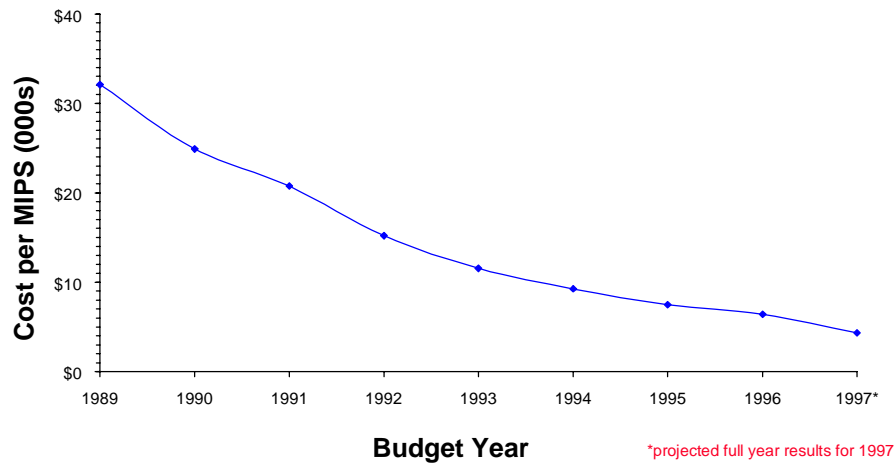
JLARC DRAFT—NOT APPROVED

Page 46

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per MIPS

Annual Decrease of 25%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 47

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Operations (15% of RD consensus budget)

- ◆ Overall operations staffing costs of \$3.3M is 11% above the government and the MIPS peer group average.
- ◆ Operations staffing of 81 is also above the peer groups and 11% above the government group.
- ◆ Although the overall compensation level of \$40,230 per person is below the peer groups, the higher cost is driven by the additional headcount to support both the IBM and UNISYS technology.
- ◆ The average government installation supporting equivalent CPU capacity would have 74 operators.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 48

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Operations (Cont'd)

- ◆ IBM operations staffing costs of \$1.8M is 17% below the government and the MIPS peer group average.
- ◆ IBM operations staffing of 47 is on par with the MIPS peer group and 15% below the government group.
- ◆ UNISYS operations staffing costs of \$1.4M is 94% above the government peer group and 26% above the MIPS peer group average.
- ◆ UNISYS operations staffing of 35 is 58% above the MIPS peer group and 86% above the government group.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 49

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Technical Services

Management—Managing three or more of the following functions:

System Programmers

- Operating System Support
- Subsystem Support
- Internal Systems Support

Security

Performance Measurement

- Performance Analysis
- Capacity Planning
- Storage Management

Virginia DIT

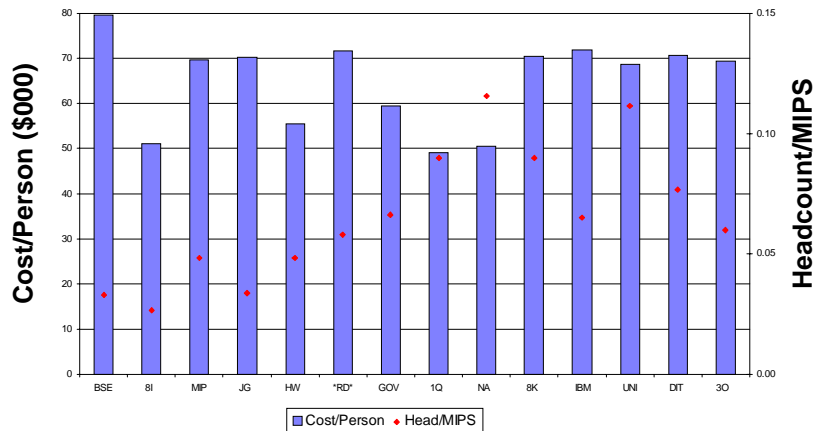
JLARC DRAFT—NOT APPROVED

Page 50

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Staff Comparison

Staffing Levels and Cost Per Person



Government Group

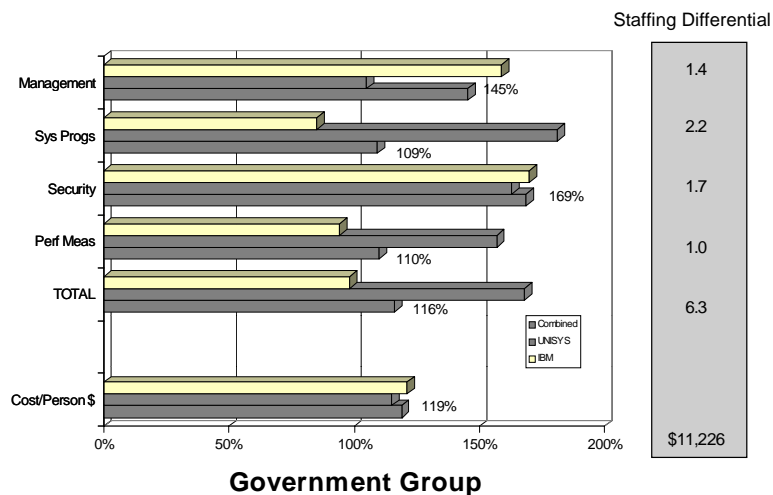
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 51

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Headcount per MIPS



Government Group

Sys Progs: Operating System Support, Subsystem Support, Internal Systems Support
Perf Meas: Performance Analysis, Capacity Planning, Storage Management

Virginia DIT

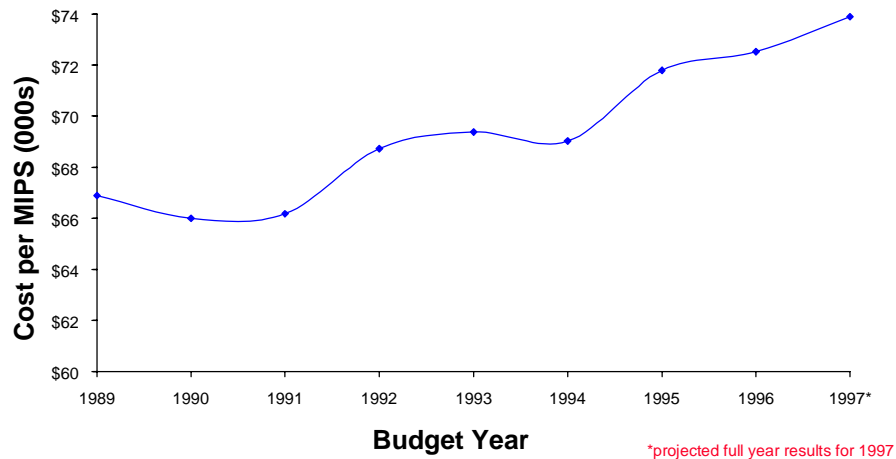
JLARC DRAFT—NOT APPROVED

Page 52

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per Head

Annual Increase of 1%



Virginia DIT

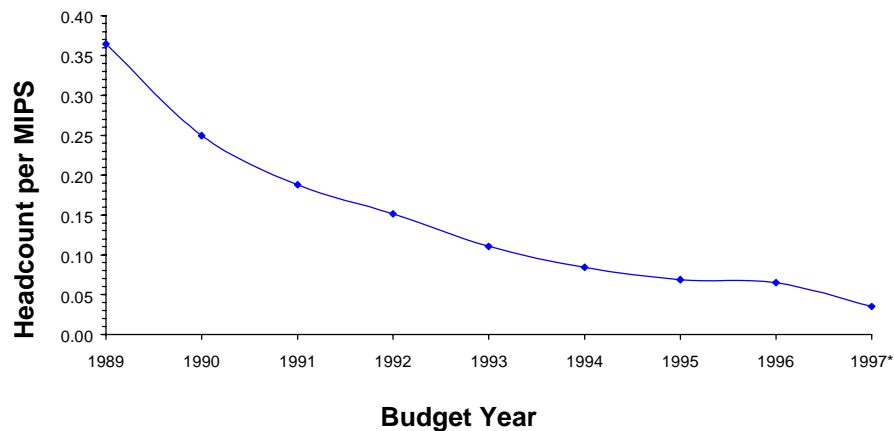
JLARC DRAFT—NOT APPROVED

Page 53

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Heads per MIPS

Annual Decrease of 30%



Virginia DIT

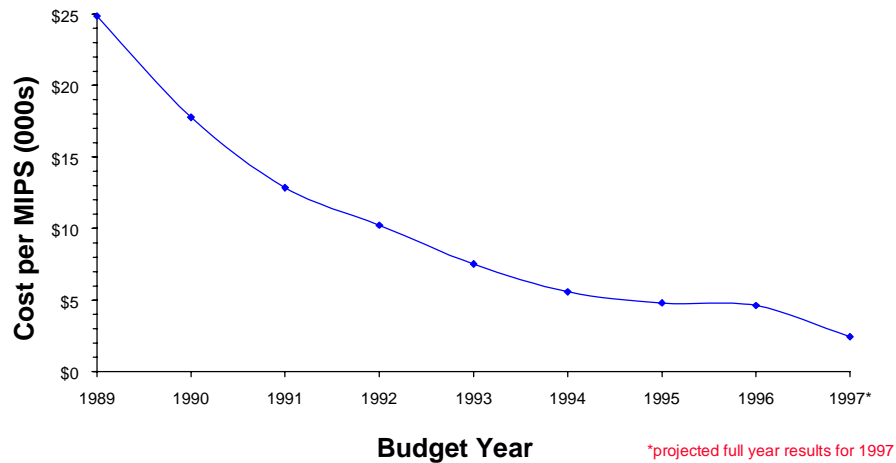
JLARC DRAFT—NOT APPROVED

Page 54

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per MIPS

Annual Decrease of 30%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 55

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Technical Services (15% of RD consensus budget)

- ◆ Overall technical services staffing costs of \$3.2M is 40% above the government and 75% above the MIPS peer group averages.
- ◆ Technical services staffing of 46 is also well above the peer groups and 16% above the government group.
- ◆ The overall compensation level of \$70.680 per person is on par with the other peer groups and 19% higher than the government peer group.
- ◆ The higher cost is driven by both the additional headcount to support the IBM and UNISYS technology and the higher cost per person.
- ◆ The average government installation supporting equivalent CPU capacity would have 40 technical services personnel.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 56

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Technical Services (Cont'd)

- ◆ IBM staffing cost of \$2M is 21% above the government and 26% above the MIPS peer group average.
- ◆ IBM staffing of 29 is on par with the government peer group and 30% above the MIPS group.
- ◆ UNISYS staffing costs of \$1.1M is 97% above the government peer group and 58% above the MIPS peer group average.
- ◆ UNISYS staffing of 17 is 62% above the MIPS peer group and 68% above the government group.
- ◆ Security headcount for both IBM and UNISYS is 65% higher than the government peer group.

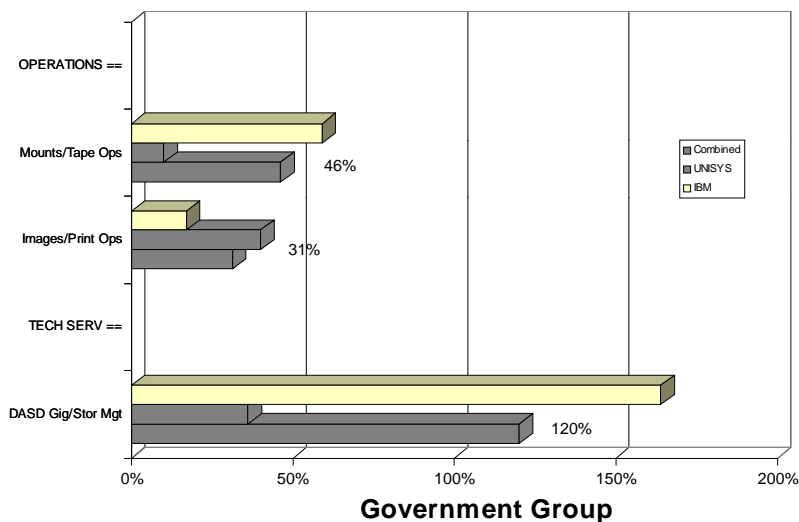
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 57

REAL DECISIONS
A GARTNER GROUP COMPANY

Productivity Comparison



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 58

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

- ◆ Capacity Utilization Levels
- ◆ Workload Model Review

Customer Demand Processed by Installed Capacity

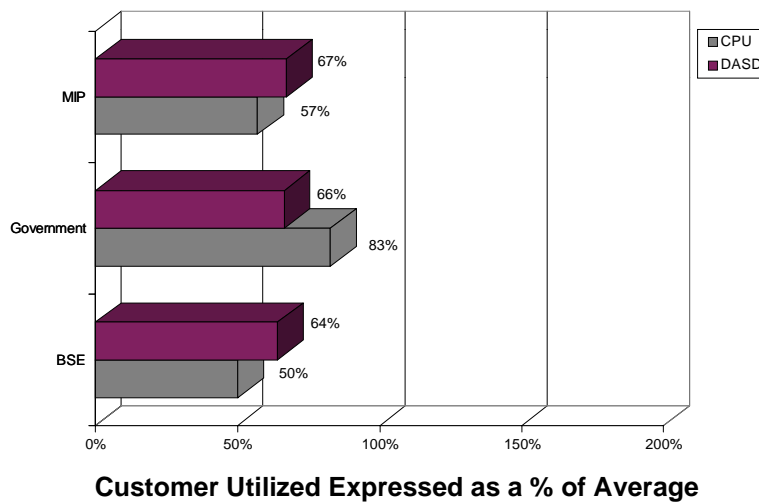
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 59

REAL DECISIONS
A GARTNER GROUP COMPANY

Capacity Utilization



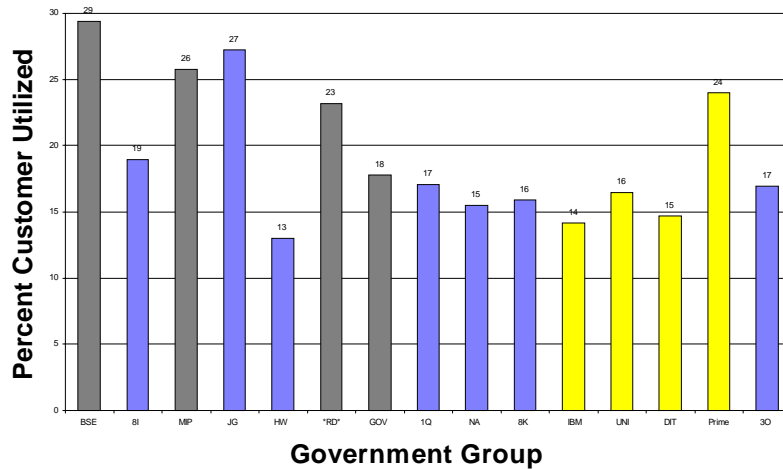
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 60

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS



Virginia DIT

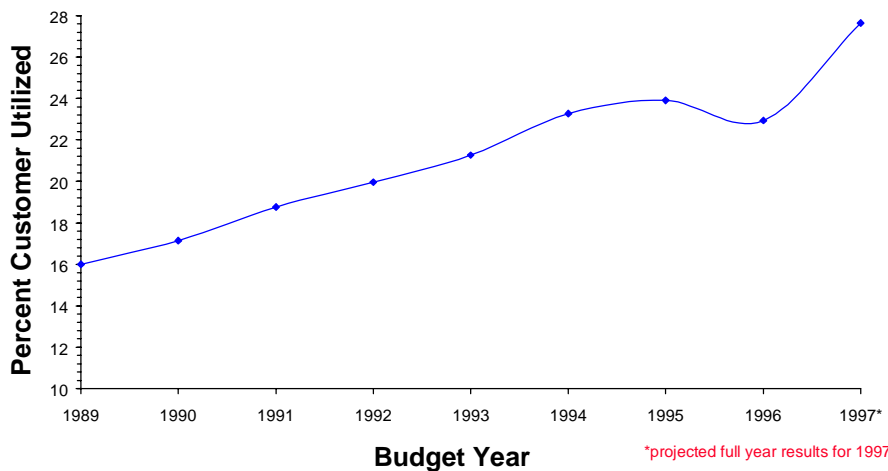
JLARC DRAFT—NOT APPROVED

Page 61

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS

Annual Increase of 6%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 62

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

CPU

- ◆ Customer CPU utilization of 15% is being compared on a 7 X 24 operation. Prime utilization is at 24%.
- ◆ CPU workload profile: Prime 43%, non-prime 41%, weekends and holidays 16%
- ◆ Service workload profile: Batch 37%, Interactive 6%, On-line 57%
- ◆ Overall customer CPU utilization is 17% lower than the average government installation and much lower than the other peer groups.
- ◆ An increase in CPU utilization to the government peer group average of 18%, improves the NOW Index from 1.10 to 0.95

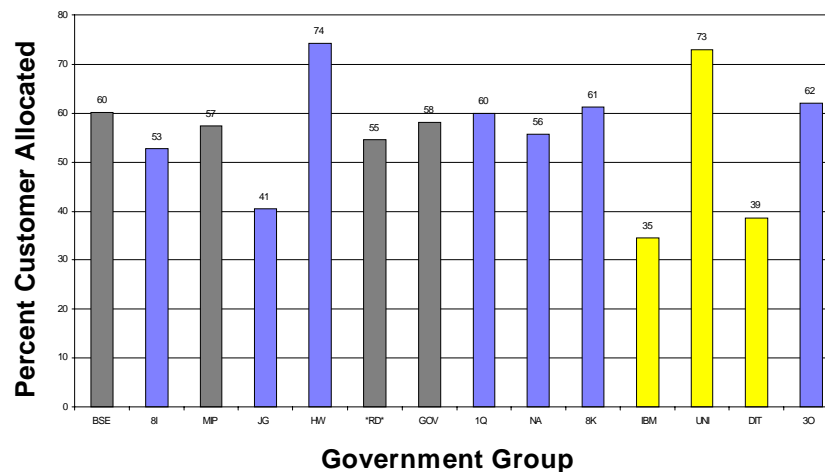
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 63

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD



Virginia DIT

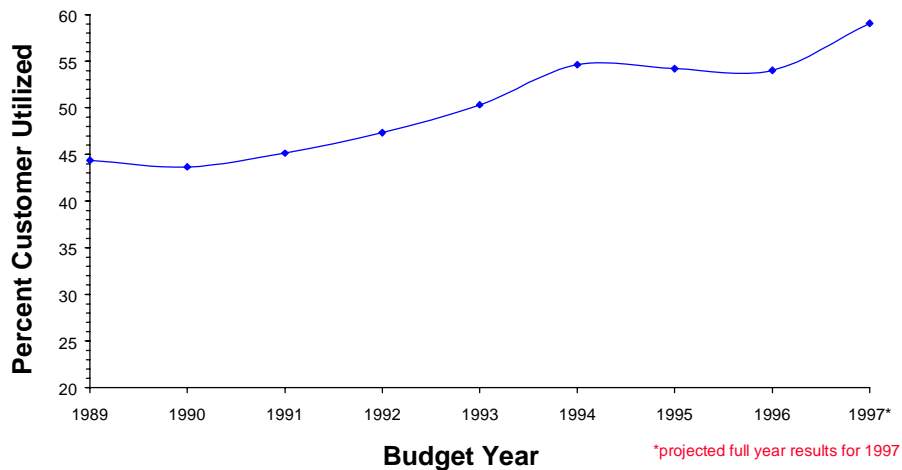
JLARC DRAFT—NOT APPROVED

Page 64

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD

Annual Increase of 4%



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 65

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

DASD

- ◆ DASD utilization of 38% is lower than the other peer groups overall and 34% below the government peer group average.
- ◆ IBM DASD utilization of 35% is also lower than the other peer groups overall and 40% below the government peer group average.
- ◆ UNISYS DASD utilization of 73% is higher than the other peer groups overall and 26% higher than the government peer group average.
- ◆ An increase in overall DASD utilization to the government peer group average of 58%, improves the NOW Index from 1.10 to 1.01.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 66

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Customer Volumes

- ◆ Overall the volume of customer work produced below the peer groups and 16% below the government peer group average.
- ◆ On-line volume much higher than the peer groups for both systems.
- ◆ Tape volume is on par with the government peer group and much higher than the other peer group averages.
- ◆ UNISYS print volume is higher than the government peer group but lower than the other groups. This is driven by the on-line viewing and printing being done by the customer agencies.

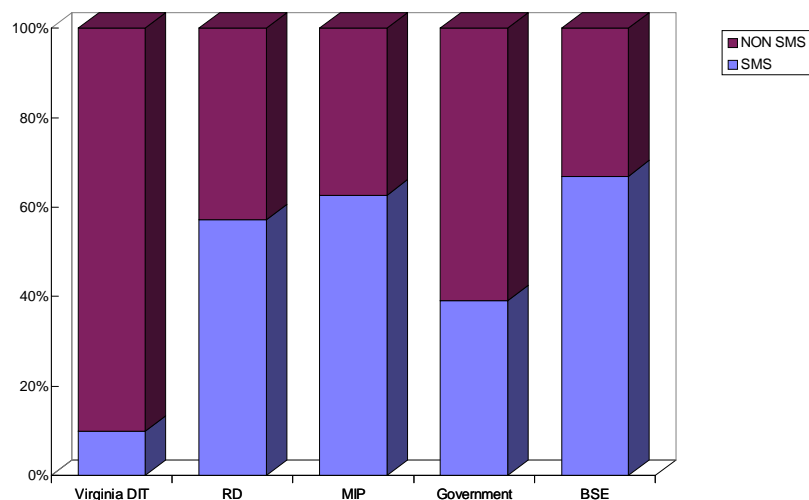
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 67

REAL DECISIONS
A GARTNER GROUP COMPANY

Mixed SMS Percentage



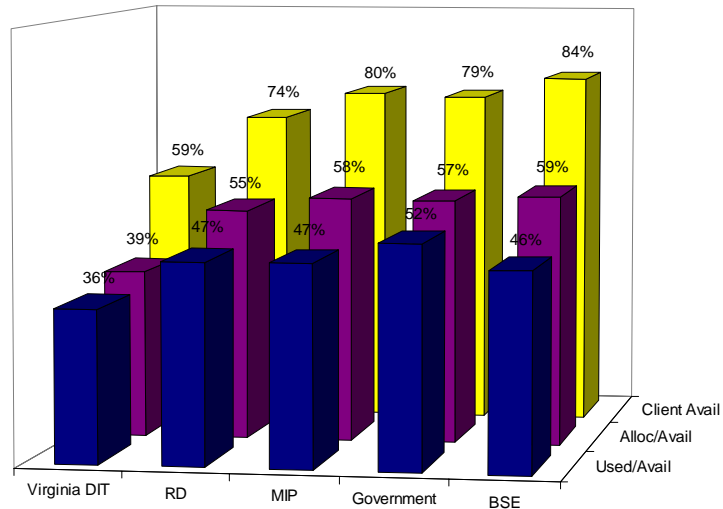
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 68

REAL DECISIONS
A GARTNER GROUP COMPANY

MVS Client DASD Comparison



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 69

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

In a manner similar to the calculation of the GDP, Real Decisions measures the annual production of RD member data centers. This technique aggregates the total work produced based on the relative unit cost for delivering individual services.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 70

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced—Total

Workload Category	Annual Production (000's)	Unit Measure	Standard Unit Cost*	Value of Work Produced (000's)
Batch	17,043	MIPS Min	\$0.20	\$3,461
Interactive	2,938	MIPS Min	\$0.30	\$885
On-Line	26,143	MIPS Min	\$0.41	\$10,615
DASD	9,123	MB	\$0.35	\$3,151
Print	1,012	K Lines	\$0.33	\$331
Tape Mount	1,092	Mounts	\$0.58	\$628
Tape Vault	1,205	Volume	\$0.35	\$424
Total				\$19,495

* based on RD average unit cost to produce each workload unit

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 71

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced—IBM

Workload Category	Annual Production (000's)	Unit Measure	Standard Unit Cost*	Value of Work Produced (000's)
Batch	15,786	MIPS Min	\$0.20	\$3,205
Interactive	2,819	MIPS Min	\$0.30	\$849
On-Line	14,547	MIPS Min	\$0.41	\$5,977
DASD	7,335	MB	\$0.35	\$2,534
Print	201	K Lines	\$0.33	\$66
Tape Mount	1,032	Mounts	\$0.58	\$594
Tape Vault	957	Volume	\$0.35	\$337
Total				\$13,562

* based on RD average unit cost to produce each workload unit

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 72

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced—Unisys

Workload Category	Annual Production (000's)	Unit Measure	Standard Unit Cost*	Value of Work Produced (000's)
Batch	1,257	MIPS Min	\$0.20	\$255
Interactive	119	MIPS Min	\$0.30	\$36
On-Line	11,596	MIPS Min	\$0.40	\$4,637
DASD	1,788	MB	\$0.35	\$618
Print	811	K Lines	\$0.33	\$265
Tape Mount	60	Mounts	\$0.58	\$35
Tape Vault	247	Volume	\$0.35	\$87
Total				\$5,933

* based on RD average unit cost to produce each workload unit

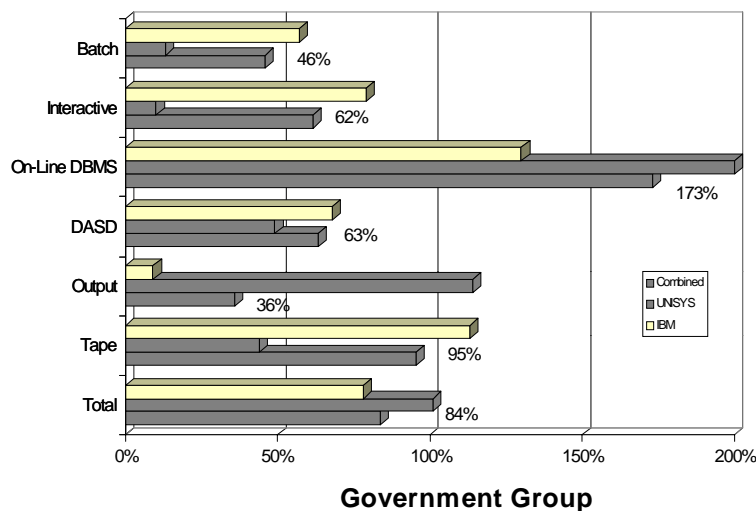
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 73

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced per MIPS



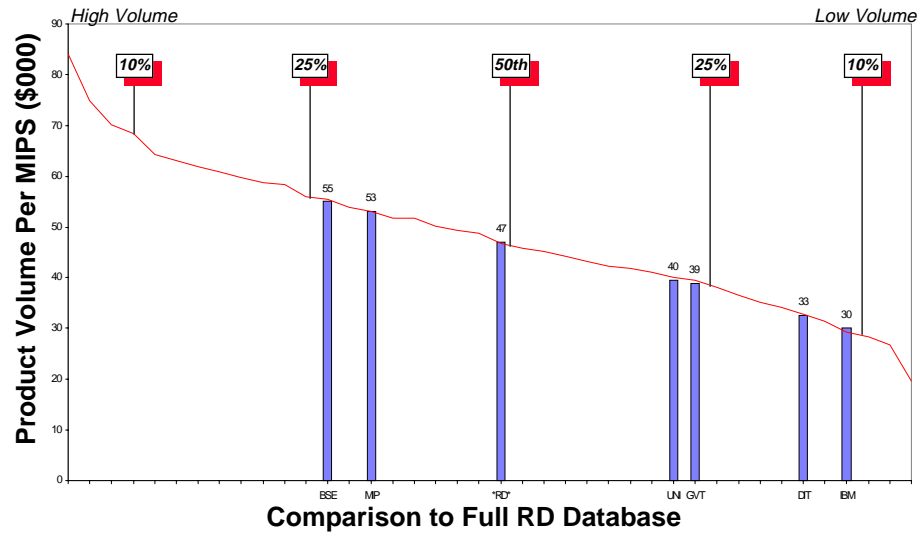
Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 74

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 75

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Calculation

Normalized Cost \$21.4 Million

Work Produced \$19.5 Million

NOW Index = 1.10

Virginia DIT

JLARC DRAFT—NOT APPROVED

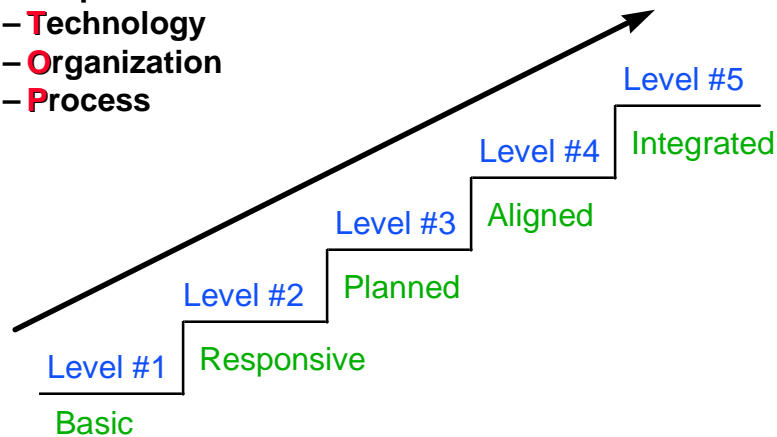
Page 76

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept

Discipline Function

- **T**echnology
- **O**rganization
- **P**rocess



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 77

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept

♦ **T**echnology

- Actual platforms, products, services and standards

♦ **O**rganization

- The staff, internal and external that bring the technology and process to the customers

♦ **P**rocess

- Actions or operations that enables the technology for the business

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 78

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

- ◆ Asset Management:
Procurement
- ◆ Change Management:
Changes/Moves/Adds
- ◆ Customer Service:
Service Level Objectives

Virginia DIT

JLARC DRAFT—NOT APPROVED

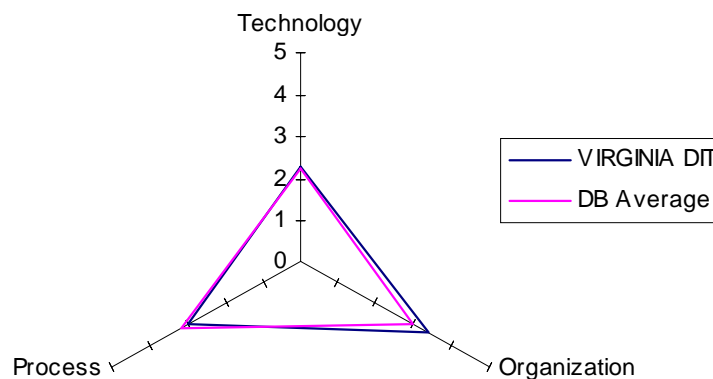
Page 79

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Asset Management—Overall Score 2.9 vs. DB at 2.8

Procurement Overall Averages



Virginia DIT

JLARC DRAFT—NOT APPROVED

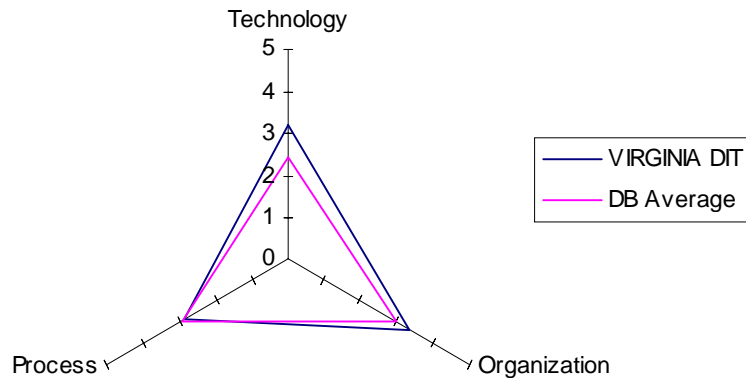
Page 80

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Change Management—Overall Score 3.1 vs. DB at 2.8

Moves/Adds/Changes Overall Averages



Virginia DIT

JLARC DRAFT—NOT APPROVED

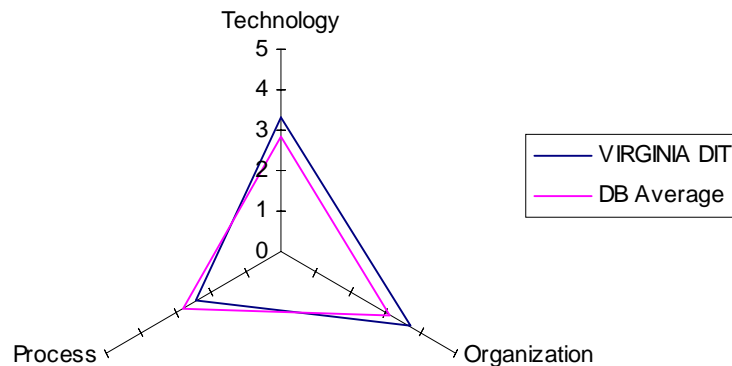
Page 81

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Customer Service—Overall Score 3.1 vs. DB at 2.9

Service Levels Agreements Overall Averages



Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 82

REAL DECISIONS
A GARTNER GROUP COMPANY

Data Center Analysis Results

Q & A

Virginia DIT

JLARC DRAFT—NOT APPROVED

REAL DECISIONS
A GARTNER GROUP COMPANY

Gartner Group

- ◆ Premier IT advisory company in the world
- ◆ Provides research, analysis and advice on IT strategies for users, purchasers and vendors of IT products and services
- ◆ Staff of more than 500 of best trained and most tenured analysts in the IT field
- ◆ Breadth and depth of IT services that is unmatched in the industry
- ◆ Understand client's IT needs and provide specific services to match needs
- ◆ Over 23,000 clients representing over 6,700 organizations worldwide

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 84

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions

- ◆ The premier worldwide provider of IT Continuous Improvement Services
- ◆ Over 20 years of experience in benchmarking services
- ◆ The most comprehensive client database representing more than 600 organizations and over 5,000 strategic quantitative measurements
- ◆ More than 100 analysts representing extensive worldwide business, IT and quantitative science management experience
- ◆ Provides a suite of services that measure the efficiency of IT environments

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 85

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Aerospace

Allied Signal Aerospace Co.
Daimler-Benz Aerospace Airbus GmbH (GERMANY)
Lockheed Martin
McDonnell Douglas Corporation

Banking

ANZ Banking Group NZ Ltd (NEW ZEALAND)
BBS, Bankenes Betalingssentral A/S (NORWAY)
Banca Commerciale Italiana (ITALY)
Banca Nazionale Del Lavoro (ITALY)
Banca Popolare Etruria E Lanzia (ITALY)
Banco Central Hispano (SPAIN)
Banco Del Caribe SACA (VENEZUELA)
Banco Quilmes (ARGENTINA)
Banco de Boston (ARGENTINA)
Bancomer SA (MEXICO)
Bank of Montreal (CANADA)
Bank of New Zealand (NEW ZEALAND)
Branch Banking & Trust
C.S.O., SpA (ITALY)
Caja de Catalunya (SPAIN)
Carisbo (ITALY)
Cassa di Risparmio di Firenze (ITALY)
Commonwealth Banking Corporation (AUSTRALIA)

Deposit Guaranty National Bank
Hongkong & Shanghai Banking Corp., Ltd (HONG KONG)
ING Facilitair Bedrijf (THE NETHERLANDS)
Istituto Bancario San Paolo Di Torino (ITALY)
Key Services Corporation
Manufacturers & Traders Bank
Michigan National Bank
National Australia Group (SCOTLAND)
National Westminster Bank plc (UNITED KINGDOM)
NationsBank Services
PNC Bank
Plenum Management Consulting GmbH (GERMANY)
Pohlen & Robinson (NEW ZEALAND)
Rochester Community Savings
Royal Bank of Canada (CANADA)
Trust Bank of New Zealand (NEW ZEALAND)

Chemicals/Pharmaceuticals

3M Company
Abbott Laboratories
Bristol-Myers Squibb Company
Ciba-Geigy Corp. NC
Dow Chemical
E.I. Du Pont De Nemours & Co.
Hoechst Marion Roussel, Inc.
Upjohn Company

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 86

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Consumer Goods/Services

3M Company
ADVO Inc.
AT&T American Transtech
American Greetings
American Trans Tech
Avon Products Inc.
Columbia/HCA HealthCare Corporation
Companhia Siderurgica Nacional (BRAZIL)
D&B
E.I. Du Pont De Nemours & Co.
Elsevier Science Ltd (UNITED KINGDOM)
Glaxo Wellcome Inc.
Grattan plc (UNITED KINGDOM)
Hudson's Bay Company (CANADA)
IBM
ICA Handlarnas AB (SWEDEN)
James River Corporation
Joseph E. Seagram & Sons, Inc.
Kaiser Foundation Health Plan
Kimberly Clark Corporation
Kohler Company
McDonald's Corporation
Mead Corporation

Mercantile Stores
Miller Brewing Company
Nabisco Foods, Inc.
Nordstrom Company
ONCE (SPAIN)
Procter & Gamble Company
Reuters (SWITZERLAND)
St. Paul Company
Touristik Union International (GERMANY)
Whitbread & Company plc (UNITED KINGDOM)

Financial Services

Associates Information Services, Inc.
Board of Trade Clearing Corporation
Brown Brothers Harriman & Co.
Charles Schwab Company
Credit Reference Association of Aust (AUSTRALIA)
Dean Witter, Discover & Co.
Federal Home Loan Mortgage
Fidelity Investments
GE Capital Corporation
Halifax Building Society (UNITED KINGDOM)
Household Finance
ICMA Retirement Corporation

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 87

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Merrill Lynch
National Savings (UNITED KINGDOM)
Sallie Mae
State Street Bank & Trust
Sun America
TRW Corporation
Transamerica Occidental Life
Visa International, USA

Government and Education

Administrative Office of the Courts
Alberta Govt Tel/ISM Alberta (CANADA)
CA Health & Welfare Data Center
CSI Piemonte (ITALY)
California State Franchise Tax Board
City of Long Beach
City of Seattle
Commonwealth of Pennsylvania
Commonwealth of Virginia
Controllers Office
Dept of Health & Welfare
Gerencia De Informatica (SPAIN)
Government of Newfoundland & Labrador (CANADA)
Human Resources Development (CANADA)
Infocamere (ITALY)

Lincolnshire County Council (UNITED KINGDOM)
Ontario Management Board Secretariat (CANADA)
Orange County of Florida
Palm Beach County
SVB (THE NETHERLANDS)
Serpro (BRAZIL)
St. of FL Dept. of Labor & Employment
State of Alabama
State of Georgia
State of North Carolina
State of Tennessee
State of Utah
Statens Datasentral A/S (NORWAY)
Stephen P. Teale Data Center
Technology Planning & Management Corp.
US Department of State
US Patent & Trademark Office
US Postal Service
Westinghouse Savannah River Company

Insurance

AGF Fenix Sistemas (SPAIN)
Allstate Insurance
Automobile Association (UNITED KINGDOM)
Blue Cross & Blue Shield of Minnesota

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 88

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Blue Cross/Blue Shield of Maryland
Blue Cross/Blue Shield Mutual of Ohio
Blue Cross/Blue Shield of North Carolina
CIGNA Corporation
Equitable Financial Companies
General American Life Insurance
Group Health Incorporated
Health Care Services Corporation
ITT Hartford Insurance Group
John Hancock
Mutual of Omaha
Nationwide Insurance
Prudential
Shared Services Center
US Fidelity & Guaranty Co.
USAA Information

Manufacturing and Electronics

Acesita (BRAZIL)
American Honda Motor Co., Inc.
Beckman Instruments
British Steel plc (UNITED KINGDOM)
Caterpillar
Companhia Vale do Rio Doce (BRAZIL)
Leviton Manufacturing
NSI SRL (ITALY)
Nissan North America

POSDATA Company Ltd. (KOREA)
Philips Electronics
Pirelli Informatica S.P.A. (ITALY)
Sony Corporation of America
Sun Alliance & Royal Insurance (AUSTRALIA)
USX Corporation
Volkswagen of America, Inc.

Outsourcers

Andersen Consulting Chicago
Datacor/ISM Atlantic Corporation (CANADA)
Finsiel Spa (ITALY)
ISM Corporation (CANADA)
ISM SK (CANADA)
National Computer Systems (SINGAPORE)
NewTel Information Solutions Ltd. (CANADA)
Origin B.V. (THE NETHERLANDS)
Telenor Teamco A/S (NORWAY)

Petroleum and Gas

Amerada Hess
Amoco Corporation
Arco Exploration & Production Tech
Chevron Information Technology Company
Shell Services Co.

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 89

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Telecommunications

AT&T Universal Card Services Corp.
AirTouch Cellular
Alberta Govt Tel/ISM Alberta (CANADA)
Alcatel Bell Telephone (BELGIUM)
Alcatel CIT (FRANCE)
Alcatel SEL AG (GERMANY)
Alcatel SESA (SPAIN)
Bell Atlantic NYNEX Mobile, Inc.
Bell Sygma (CANADA)
BellSouth Information Systems
Ericsson Radio Systems
Ericsson Telecomunicazioni SpA (ITALY)
GTE - US
GTE Telephone Operations HQ
MCI Communications Corporation
NYNEX
SaskTel (CANADA)
TPI (SPAIN)
Telecom A/S (DENMARK)
Telecom Australia (AUSTRALIA)
Telus (CANADA)
Telus/Edmonton Telephone (CANADA)

Transportation

CSX Technology
Caliber Technology, Inc.
Canadian National Railways (CANADA)
Ente Ferrovie Dello Stato (ITALY)
Galileo International
RATP (FRANCE)
Tranzrail New Zealand Limited (NEW ZEALAND)

Utilities

AGL Gas Company Ltd. (AUSTRALIA)
American Electric Power
Boston Edison
British Gas Transco (UNITED KINGDOM)
CESP-Cia Energetica do Estado de S.P. (BRAZIL)
CIA Sevillana de Electricidad (SPAIN)
CPFL (BRAZIL)
Canadian Utilities Ltd. (CANADA)
Carolina Power & Light
Central & South West Services
China Light & Power Co., Ltd. (HONG KONG)
Columbia Gas System Services
Commonwealth Edison
Companhia De Telefones Do Brasil (BRAZIL)

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 90

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Duke Power
ENEL SpA (ITALY)
Edinfor - Sistemas Informaticos, s.a. (PORTUGAL)
Edison International
Energie-Versorgung Schwaben AS (GERMANY)
Entergy Systems
F.E.C.S.A. (SPAIN)
Florida Power Corporation
Hydro-Quebec (CANADA)
Illinois Power
Integral Energy (AUSTRALIA)
Kentucky Utilities Company
LA Dept. of Water & Power
North West Water Ltd. (UNITED KINGDOM)
Northeast Utilities
Northern Ireland Electricity plc (UNITED KINGDOM)
Ontario Hydro (CANADA)
Seaboard plc (UNITED KINGDOM)
Southern Company Services
Texas Utilities
Utilicorp
Virginia Power

Virginia DIT

JLARC DRAFT—NOT APPROVED

Page 91

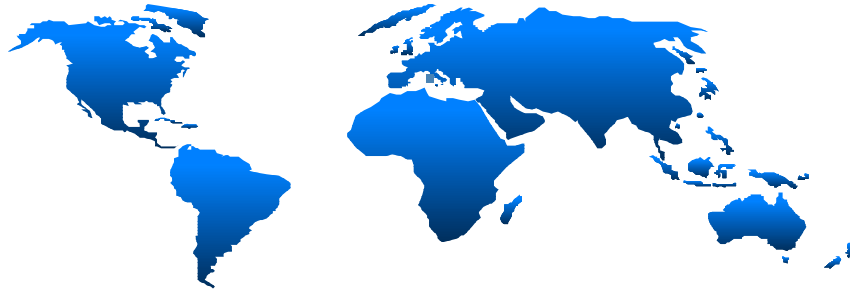
REAL DECISIONS
A GARTNER GROUP COMPANY

UVA Data Center

The logo consists of a teal rectangular box with the text "UVA Data Center" in yellow. The box has a subtle drop shadow effect, appearing slightly offset from the background.

University of Virginia

Data Center Analysis



A Comparative Benchmark Annual Report

REALDECISIONS
A GARTNER GROUP COMPANY

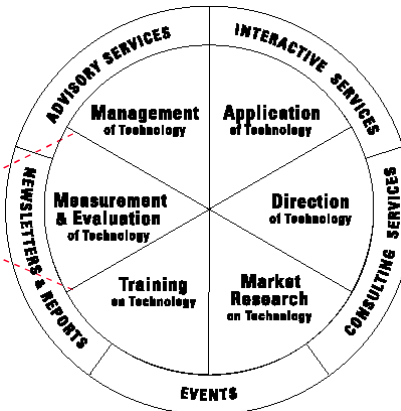
Meeting Agenda

- ◆ Introduction and Project Guidelines
- ◆ Summary of Overall Study Results
- ◆ Specific Areas of Review and Analysis
 - Annual Operating Expenditures
 - Staffing Levels and Costs
 - Customer Work Produced
- ◆ TOP Model Analysis
- ◆ Q & A

Gartner Group and Real Decisions Core Areas of IT Expertise

- By combining the expertise of both Gartner Group and Real Decisions, we are ready to serve your IT advisory needs for today and tomorrow.

Real Decisions' Continuous Improvement Services



University of VA

JLARC DRAFT—NOT APPROVED

Page 3

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions Service Deliverables

Real Decisions services provide for continuous evaluation and improvement of IT contribution to your business



University of VA

JLARC DRAFT—NOT APPROVED

Page 4

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Scope of Study

- ◆ Fiscal 1996 Data Center Efficiency Analysis
 - Study period from July 1995 through June 1996.
 - IBM MVS mainframe environment.
 - Includes peripheral DASD, Tape Storage, and Print.
 - For comparison, the University of Virginia weighted average capacities of 79 MIPS and 171 GB of DASD are used.

University of VA

JLARC DRAFT—NOT APPROVED

Page 5

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Profile of Comparison Groups

Detail

- ◆ MIPS
 - Fifteen installations with an installed MIPS size of between 61 and 98 MIPS. The average size is 79 MIPS.

Summary

- ◆ Government
 - Five Installations with an average capacity of 80 MIPS
- ◆ Best in Class (BIC)
 - Five installations with an average installed capacity of 80 MIPS.

University of VA

JLARC DRAFT—NOT APPROVED

Page 6

REAL DECISIONS
A GARTNER GROUP COMPANY

Best in Class

Criteria

Data centers with installed computer capacities under 100 MIPS performing general-purpose processing and whose cost-efficiency ratings are less than 1.0

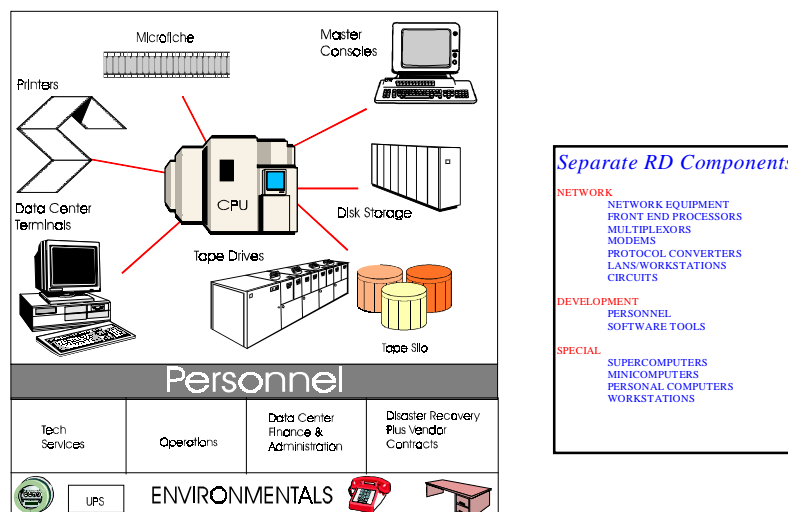
University of VA

JLARC DRAFT—NOT APPROVED

Page 7

REAL DECISIONS
A GARTNER GROUP COMPANY

Consensus Data Center Model



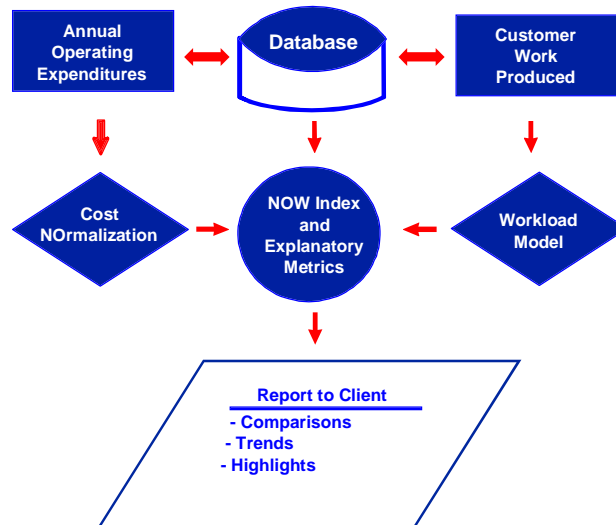
University of VA

JLARC DRAFT—NOT APPROVED

Page 8

REAL DECISIONS
A GARTNER GROUP COMPANY

Overview: Data Center Evaluation



University of VA

JLARC DRAFT—NOT APPROVED

Page 9

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Normalized Cost

Work Produced

A single index to measure, rate and compare
unit cost-efficiency across the database

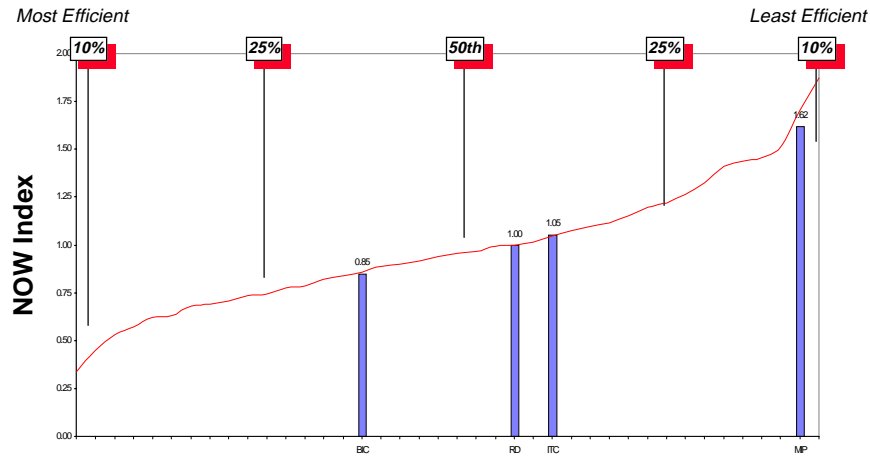
University of VA

JLARC DRAFT—NOT APPROVED

Page 10

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



Comparison to Full RD Database

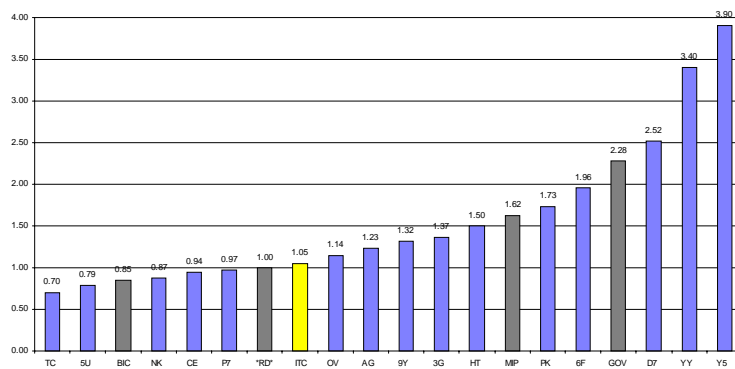
University of VA

JLARC DRAFT—NOT APPROVED

Page 11

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



61 to 98 MIPS Group

University of VA

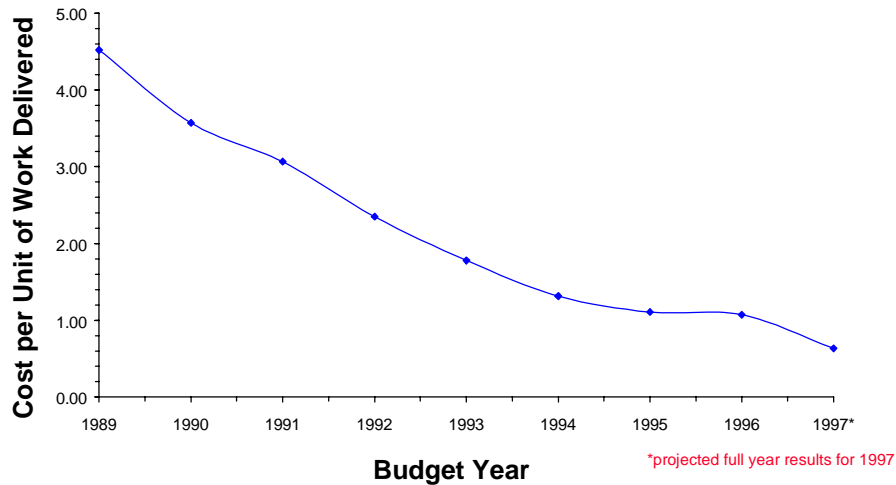
JLARC DRAFT—NOT APPROVED

Page 12

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Annual Decrease of 23%



University of VA

JLARC DRAFT—NOT APPROVED

Page 13

REAL DECISIONS
A GARTNER GROUP COMPANY

Results of Analysis

Overview

- ◆ For the study period, ITC overall data center spending per MIPS is one half of the MIPS peer group members on average.
- ◆ Total value of the work produced per MIPS is 32% lower than the MIPS peer group.
- ◆ ITC has a slight advantage versus the current database which contains a majority of 1995 data. With an average database improvement of 20% per year, ITC compared to a 1996 database would result in an estimated NOW Index closer to 1.16.

University of VA

JLARC DRAFT—NOT APPROVED

Page 14

REAL DECISIONS
A GARTNER GROUP COMPANY

Detailed Comparison

- ◆ Annual Operating Expenditures
- ◆ Staffing
- ◆ Value of Work Produced

University of VA

JLARC DRAFT—NOT APPROVED

Page 15

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

- ◆ “Consensus” Budget Model
- ◆ Standardized Cost Definition
- ◆ Categorization of Headcount and Costs

A rigorous cost normalization methodology used to establish a
“level playing field”

University of VA

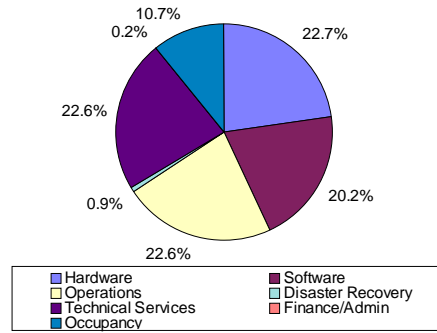
JLARC DRAFT—NOT APPROVED

Page 16

REAL DECISIONS
A GARTNER GROUP COMPANY

RD Budget Model (\$000)

Budget Category	Normalized Costs
Hardware	\$556
Software	\$495
Operations	\$552
Disaster Recovery	\$22
Technical Services	\$554
Finance/Admin	\$6
Occupancy	\$262
Total	\$2,446



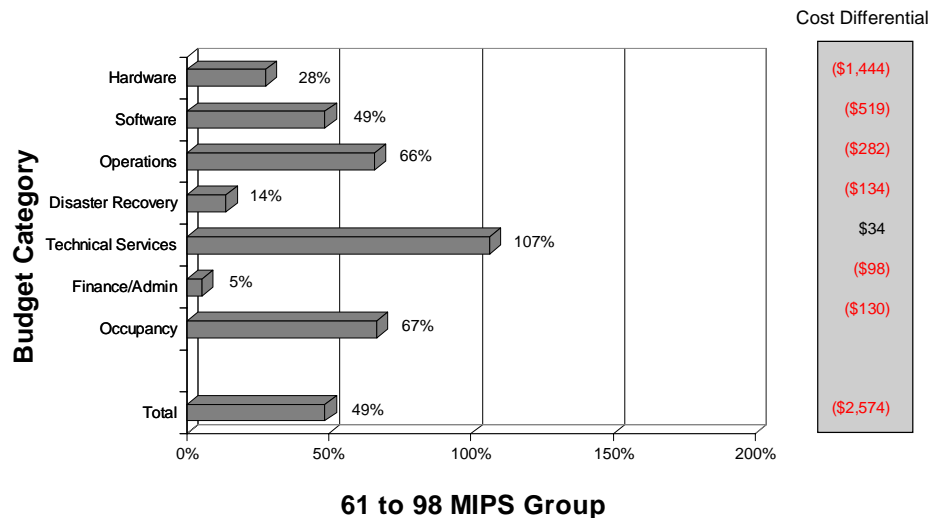
University of VA

JLARC DRAFT—NOT APPROVED

Page 17

REAL DECISIONS
A GARTNER GROUP COMPANY

Cost per Installed MIPS (\$000)



University of VA

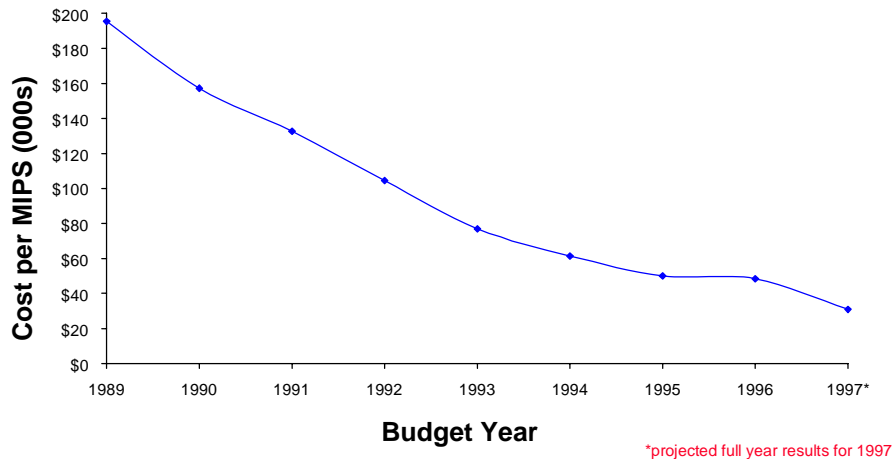
JLARC DRAFT—NOT APPROVED

Page 18

REAL DECISIONS
A GARTNER GROUP COMPANY

Total Cost per MIPS

Annual Decrease of 22%



University of VA

JLARC DRAFT—NOT APPROVED

Page 19

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Definitions

CPU—Processor complexes including processor unit, controllers, power & coolant units, power units plus upgrades, expanded storage changes, local and remote channel-to-channel adapters and coupling facility.

System Consoles—System operation consoles including master consoles and sub-system monitors, generally located in control room.

Disk Storage—All disk including 3380s, 3390s (or equivalents) but excluding optical disk or mass storage devices.

Tape Storage—Reel and cartridge drives, tape controllers, silos and automatic tape loaders.

Output Hardware—Printers, bursters, decollaters, roll paper feeds and microfiche equipment but excludes sorters or inserters.

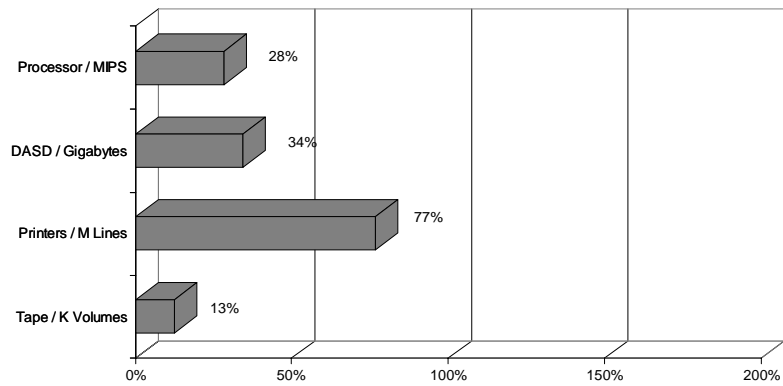
University of VA

JLARC DRAFT—NOT APPROVED

Page 20

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Costs



61 to 98 MIPS Group

University of VA

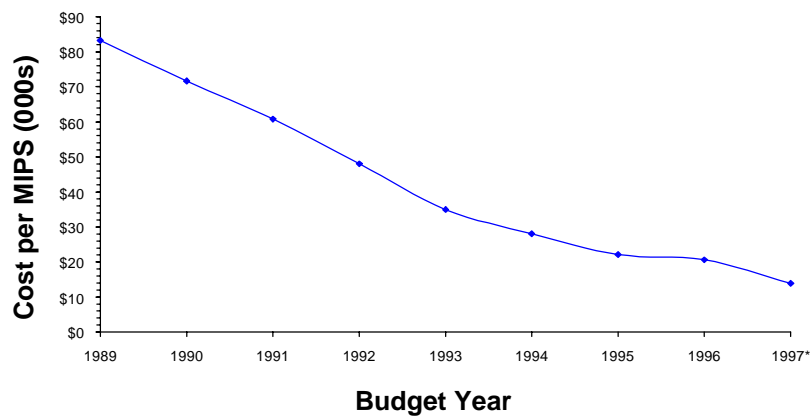
JLARC DRAFT—NOT APPROVED

Page 21

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Cost per MIPS

Annual Decrease of 21%



*projected full year results for 1997

University of VA

JLARC DRAFT—NOT APPROVED

Page 22

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (23% of RD consensus budget)

- ◆ The other peer groups spend 30% to 45% of their budget on hardware.
- ◆ Hardware costs of \$556K are well below the peer group averages, due in large part to the older equipment.
- ◆ Maintenance costs of \$142K are 35% to 58% higher than the peer groups. The higher maintenance costs are consistent with the older hardware.

University of VA

JLARC DRAFT—NOT APPROVED

Page 23

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Definitions

Operating System:

Change Management
Data Management
Output Management
Production Management
Security Management
System Management

Excluded Software:

Development
Network
Applications

Subsystem System:

4GL
3GL
Office Products

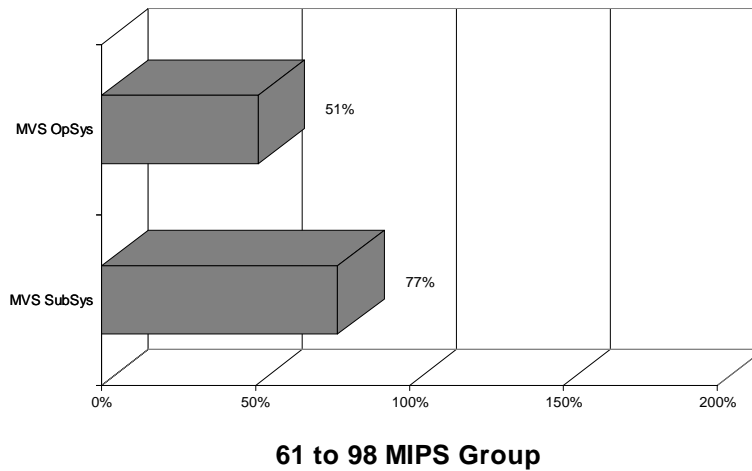
University of VA

JLARC DRAFT—NOT APPROVED

Page 24

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Costs



University of VA

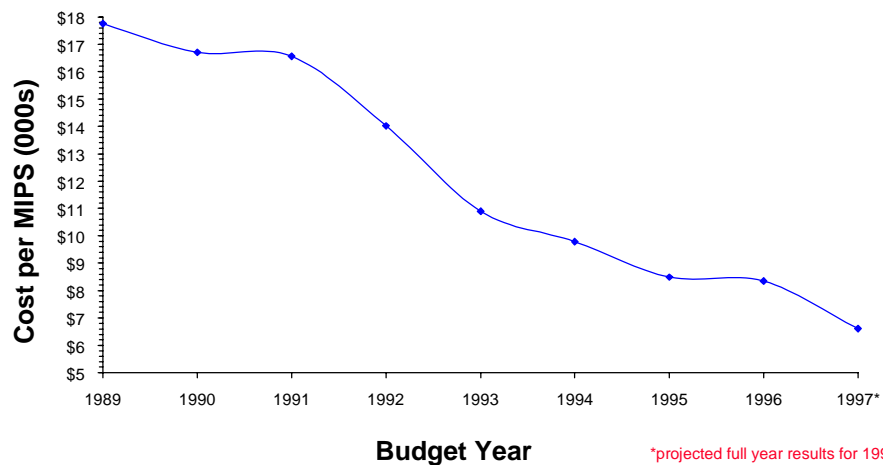
JLARC DRAFT—NOT APPROVED

Page 25

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Cost per MIPS

Annual Decrease of 12%



University of VA

JLARC DRAFT—NOT APPROVED

Page 26

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Software (20% of RD consensus budget)

- ◆ The other peer groups spend about the same percentage of their budget for software.
- ◆ Overall software costs of \$495K are also below all peer group averages and one half the average cost for the MIPS peer group.
- ◆ Lower software costs are due in part to using unsupported back level systems.
- ◆ Software costs are lower than peer group averages even with the multiple versions of CICS.

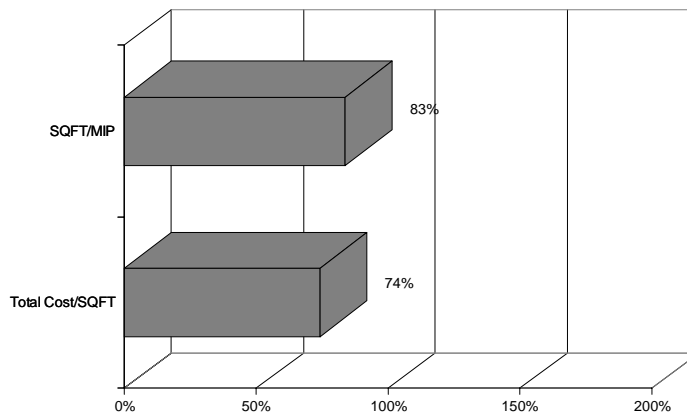
University of VA

JLARC DRAFT—NOT APPROVED

Page 27

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Costs



61 to 98 MIPS Group

University of VA

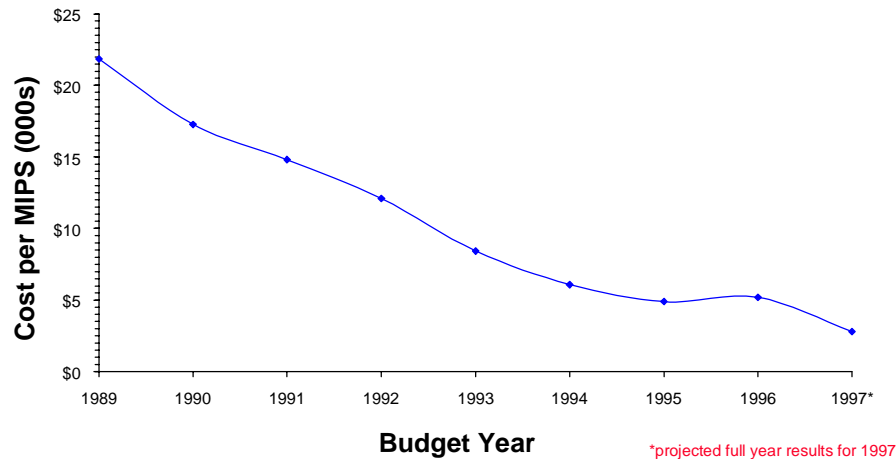
JLARC DRAFT—NOT APPROVED

Page 28

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Cost per MIPS

Annual Decrease of 23%



University of VA

JLARC DRAFT—NOT APPROVED

Page 29

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Occupancy (11% of RD consensus budget)

- ◆ The other peer groups spend about the same percentage of their budget for Occupancy.
- ◆ Occupancy costs of \$262K are lower overall than the peer group averages due to a lower square foot cost per MIPS than the peer group averages.
- ◆ The use of older hardware with the larger foot prints increases the square foot per MIPS requirement.
- ◆ The efficient use of space provides ITC with a better square foot per MIPS ratio than both the government and Best in Class peer groups.

University of VA

JLARC DRAFT—NOT APPROVED

Page 30

REAL DECISIONS
A GARTNER GROUP COMPANY

Staffing Levels and Costs

- ◆ Staffing Categories
 - Operations
 - Technical Services
- ◆ Headcount and per-capita comparisons

University of VA

JLARC DRAFT—NOT APPROVED

Page 31

REAL DECISIONS
A GARTNER GROUP COMPANY

Headcount Summary

Operations	ITC	Tech Services	ITC
Management	0.5	Management	0.1
Shift Ops	7.6	Sys Prog	6.3
Help Desk	0.0	Security	1.3
Output Serv	2.4	Perf Meas	1.4
Prod Control	3.9		
<hr/>		<hr/>	
Total	14.4	Total	9.0
Cost/Person	\$38,407		\$61,505

University of VA

JLARC DRAFT—NOT APPROVED

Page 32

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Operations

Management—(Managing three or more of the following functions)

Shift Operations

- System Operations
- Operations Support
- Tape Operations

Help Desk

Output Services

- Print Operations
- Fiche Operations

Production Control

University of VA

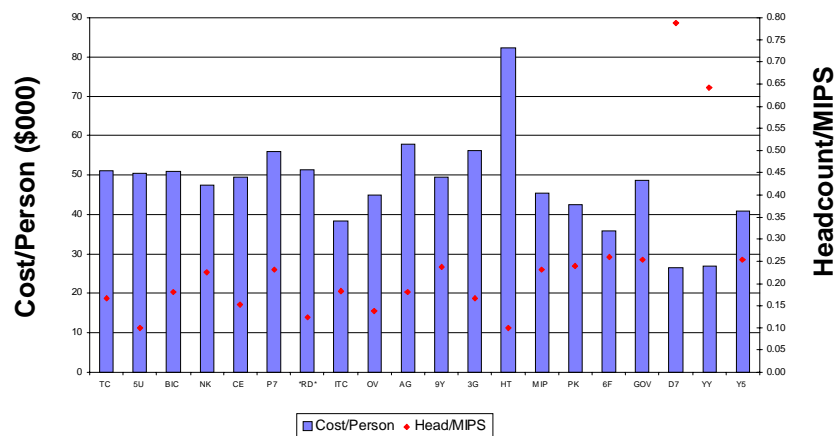
JLARC DRAFT—NOT APPROVED

Page 33

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Staff Comparison

Staffing Levels and Cost Per Person



61 to 98 MIPS Group

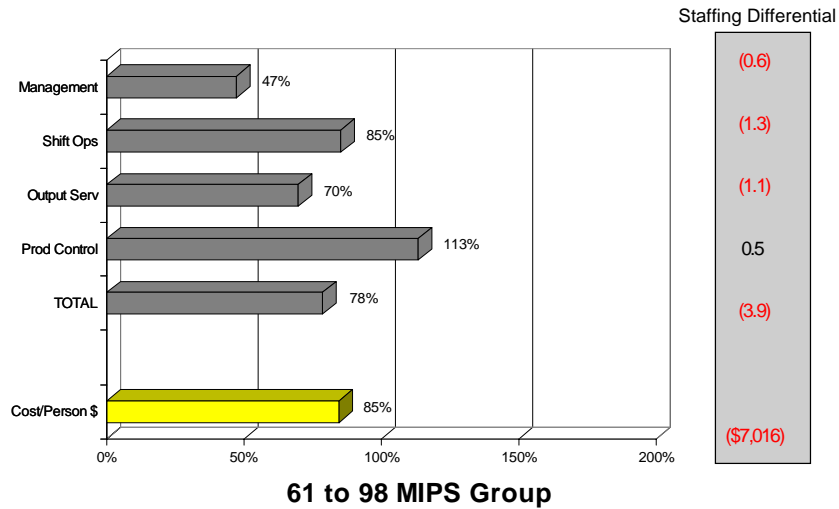
University of VA

JLARC DRAFT—NOT APPROVED

Page 34

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Headcount per MIPS



Shift Ops: System Operations, Operations Support, Tape Operations
Output Serv: Print Operations, Fiche Operations

University of VA

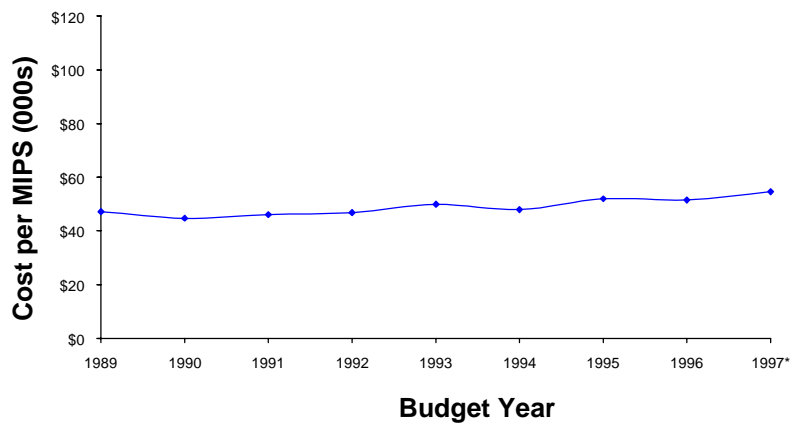
JLARC DRAFT—NOT APPROVED

Page 35

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per Head

Annual Increase of 2%



*projected full year results for 1997

University of VA

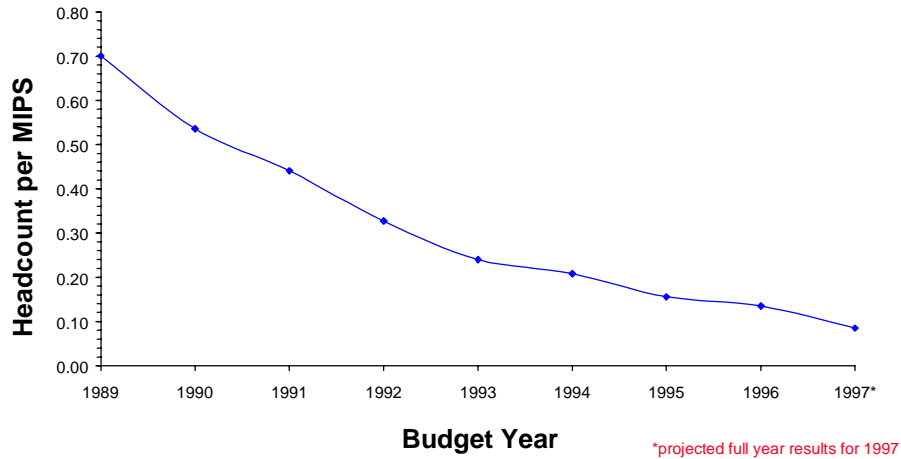
JLARC DRAFT—NOT APPROVED

Page 36

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Heads per MIPS

Annual Decrease of 26%



University of VA

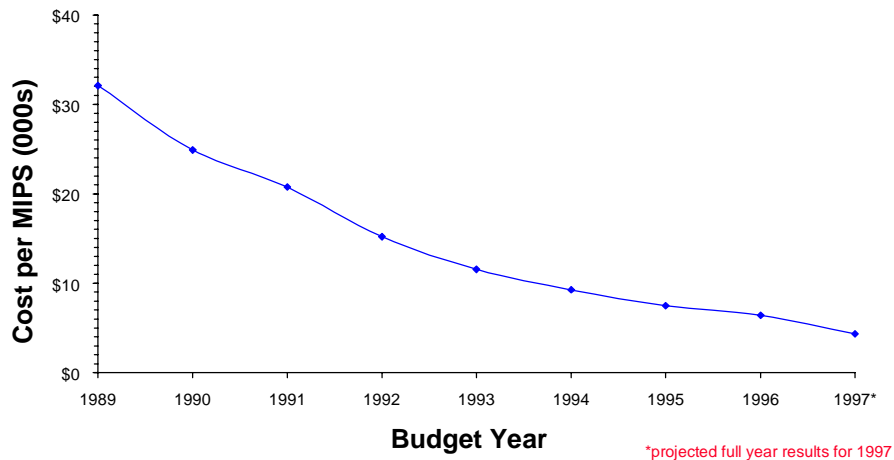
JLARC DRAFT—NOT APPROVED

Page 37

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per MIPS

Annual Decrease of 25%



University of VA

JLARC DRAFT—NOT APPROVED

Page 38

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Operations (23% of RD consensus budget)

- ◆ The other peer groups spend 14% to 18% of their budget for Operations.
- ◆ Overall operations staffing costs of \$552K is 22% to 38% below the peer group averages.
- ◆ Operations staffing of 14 is on par with the Best in Class peer group and 22% to 28% below the other peer groups.
- ◆ Both the lower staffing level and the lower cost per person contribute to the lower overall operations cost.

University of VA

JLARC DRAFT—NOT APPROVED

Page 39

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Technical Services

Management—(Managing three or more of the following functions)

System Programmers

- Operating System Support
- Subsystem Support
- Internal Systems Support

Security

Performance Measurement

- Performance Analysis
- Capacity Planning
- Storage Management

University of VA

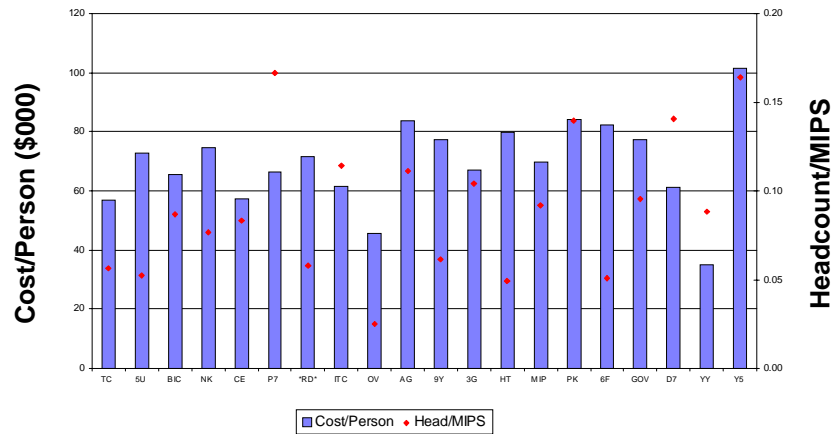
JLARC DRAFT—NOT APPROVED

Page 40

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Staff Comparison

Staffing Levels and Cost Per Person



61 to 98 MIPS Group

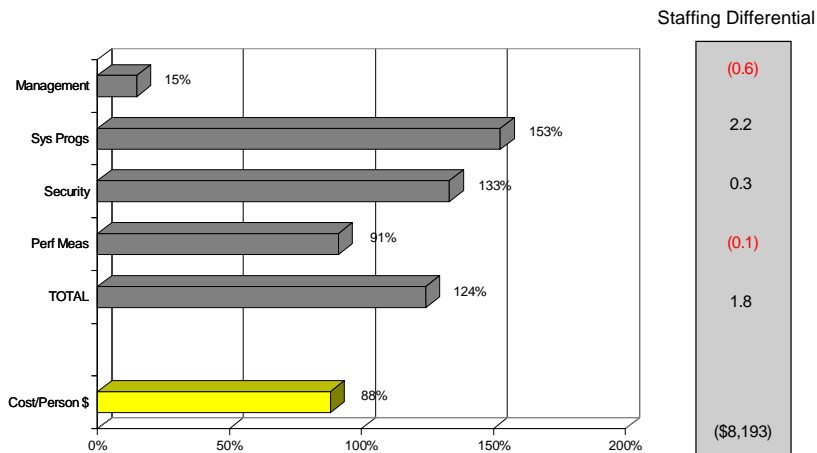
University of VA

JLARC DRAFT—NOT APPROVED

Page 41

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Headcount per MIPS



61 to 98 MIPS Group

Sys Progs: Operating System Support, Subsystem Support, Internal Systems Support
Perf Meas: Performance Analysis, Capacity Planning, Storage Management

University of VA

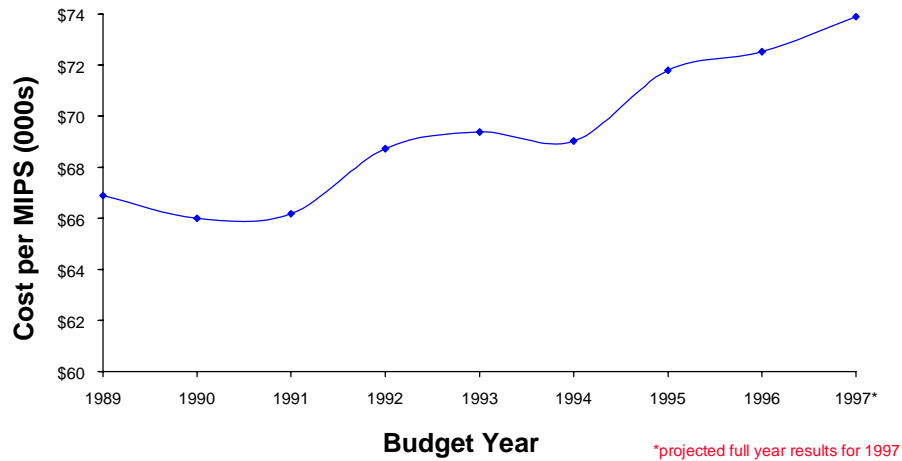
JLARC DRAFT—NOT APPROVED

Page 42

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per Head

Annual Increase of 1%



University of VA

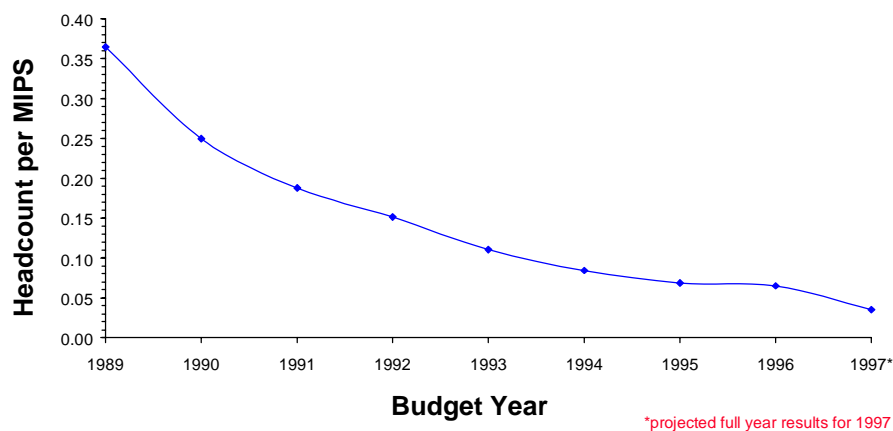
JLARC DRAFT—NOT APPROVED

Page 43

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Heads per MIPS

Annual Decrease of 30%



University of VA

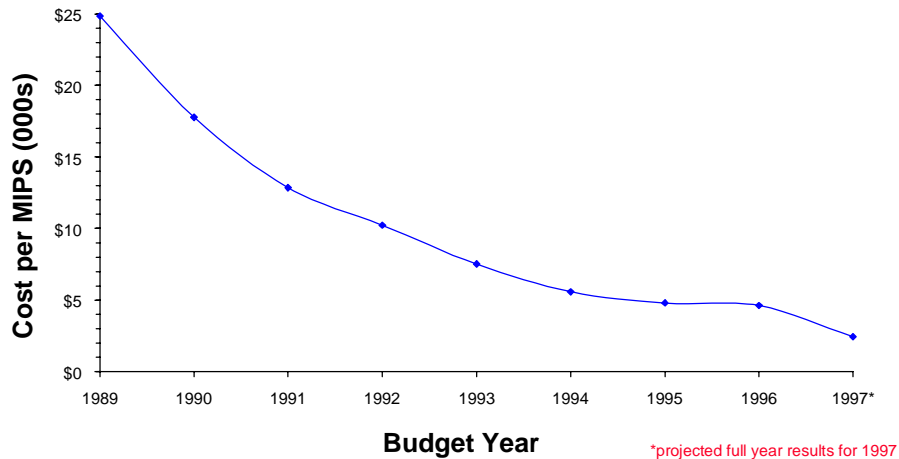
JLARC DRAFT—NOT APPROVED

Page 44

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per MIPS

Annual Decrease of 30%



University of VA

JLARC DRAFT—NOT APPROVED

Page 45

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Technical Services (23% of RD consensus budget)

- ◆ The other peer groups spend 9% to 11% of their budget for technical Services.
- ◆ Overall technical services staffing costs of \$554K is on par with the government and MIPS peer group and 23% above the Best in Class peer group average.
- ◆ The overall technical services cost is due to a higher staffing level for a comparable capacity data center.
- ◆ The higher staffing level is due in part to the requirement to maintain multiple versions of software systems.

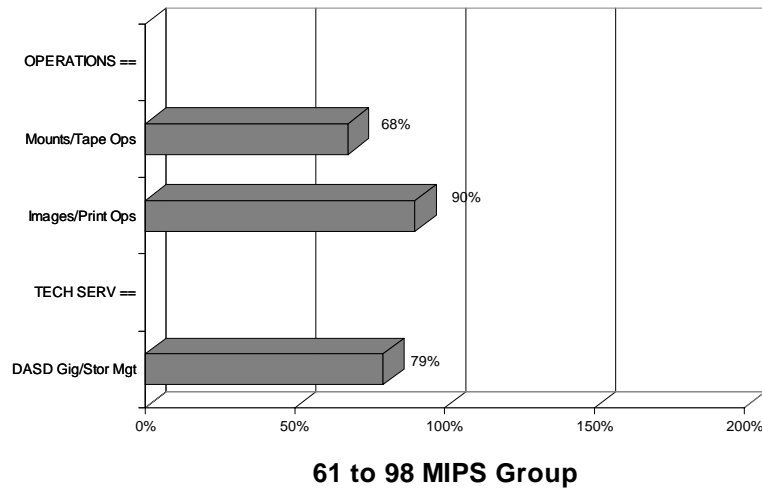
University of VA

JLARC DRAFT—NOT APPROVED

Page 46

REAL DECISIONS
A GARTNER GROUP COMPANY

Productivity Comparison



University of VA

JLARC DRAFT—NOT APPROVED

Page 47

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

- ◆ Capacity Utilization Levels
- ◆ Workload Model Review

Customer Demand Processed by Installed Capacity

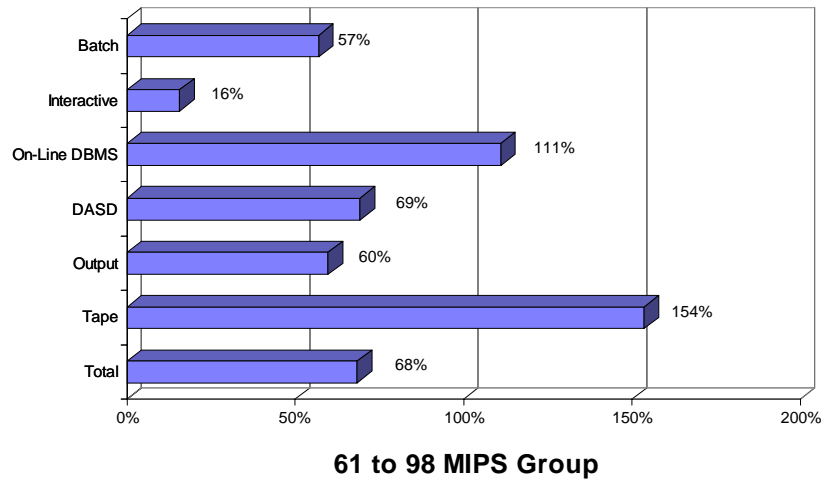
University of VA

JLARC DRAFT—NOT APPROVED

Page 48

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced per MIPS



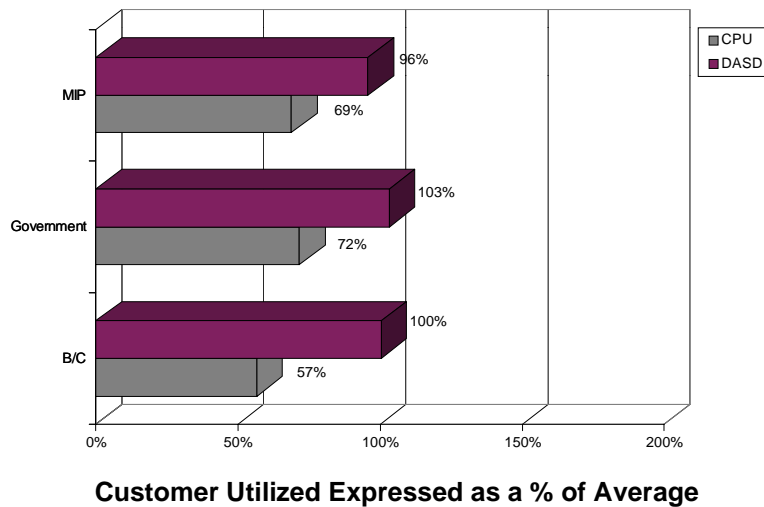
University of VA

JLARC DRAFT—NOT APPROVED

Page 49

REAL DECISIONS
A GARTNER GROUP COMPANY

Capacity Utilization



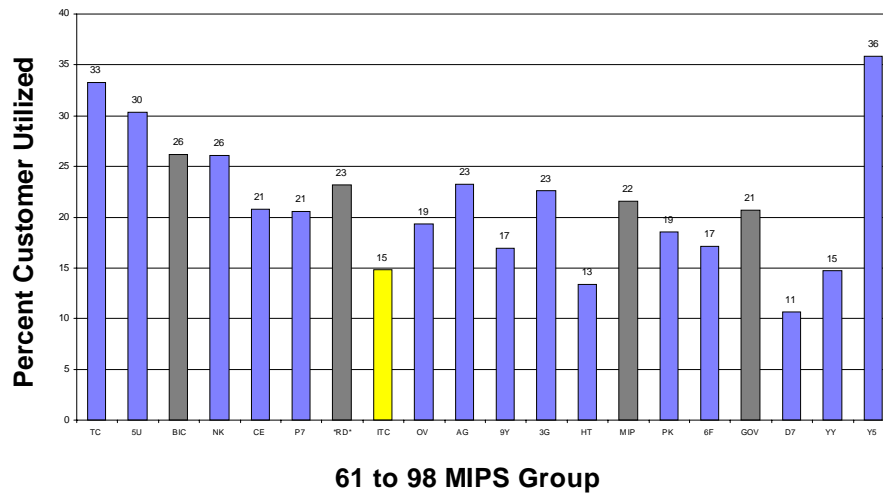
University of VA

JLARC DRAFT—NOT APPROVED

Page 50

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS



University of VA

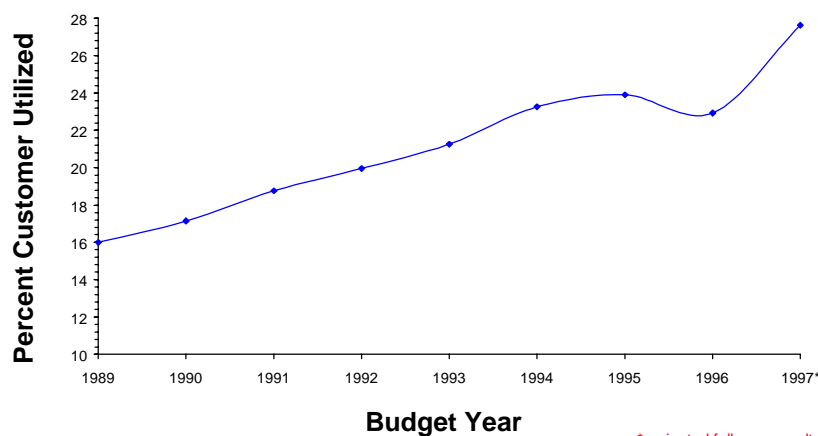
JLARC DRAFT—NOT APPROVED

Page 51

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS

Annual Increase of 6%



*projected full year results for 1997

University of VA

JLARC DRAFT—NOT APPROVED

Page 52

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

CPU

- ♦ Customer CPU utilization of 15% is being compared on a 7 X 24 operation.
- ♦ CPU workload profile: Prime 48%, non-prime 52%.
- ♦ Online (CICS/SUPRA) workload is 11% to 43% higher than the MIPS and government peer groups, but 33% lower than the Best in Class peer group average.

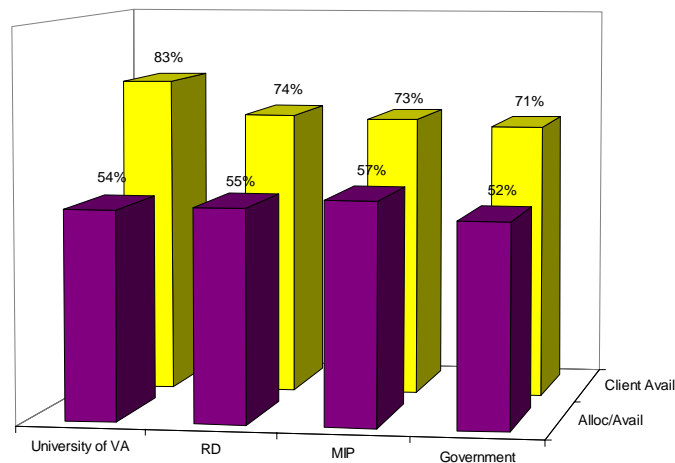
University of VA

JLARC DRAFT—NOT APPROVED

Page 53

REAL DECISIONS
A GARTNER GROUP COMPANY

MVS Client DASD Comparison



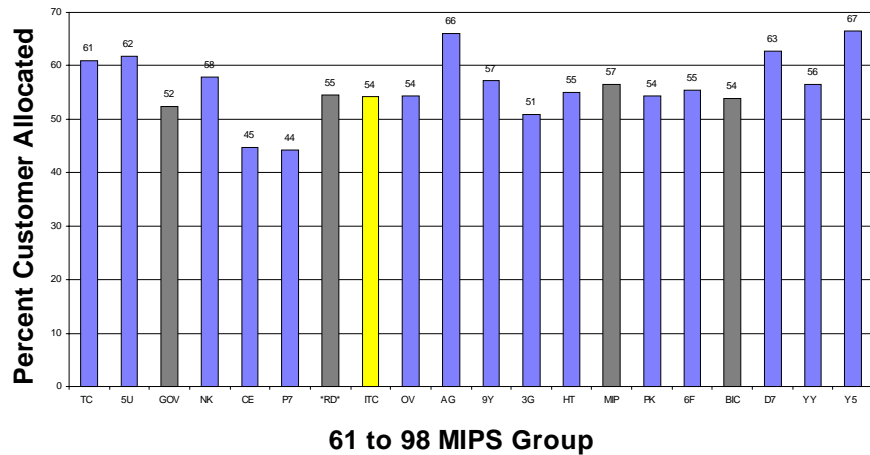
University of VA

JLARC DRAFT—NOT APPROVED

Page 54

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD



University of VA

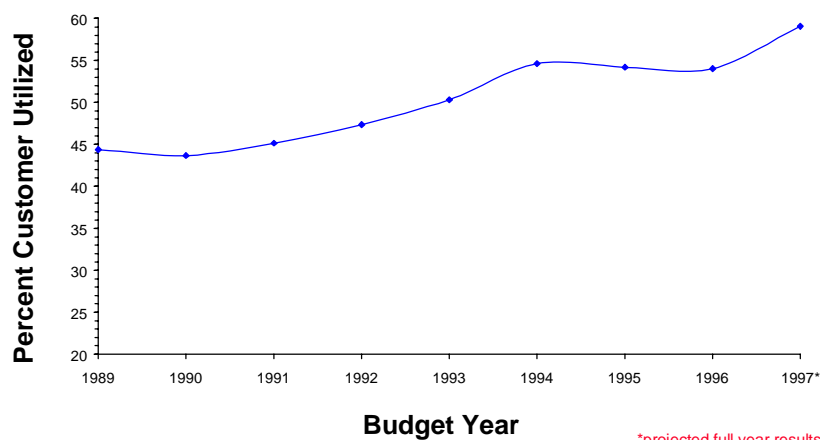
JLARC DRAFT—NOT APPROVED

Page 55

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD

Annual Increase of 4%



*projected full year results for 1997

University of VA

JLARC DRAFT—NOT APPROVED

Page 56

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

DASD

- ◆ DASD utilization of 54% is on par with the peer groups overall.
- ◆ The less than average customer disk of 92 GB for a 79 MIPS data center contributes to the smaller volume of worked produced.
- ◆ The average customer disk for a 79 MIPS data center in the Best in Class peer group would be 151 GB.

University of VA

JLARC DRAFT—NOT APPROVED

Page 57

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

In a manner similar to the calculation of the GDP, Real Decisions measures the annual production of RD member data centers. This technique aggregates the total work produced based on the relative unit cost for delivering individual services.

University of VA

JLARC DRAFT—NOT APPROVED

Page 58

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced—Total

Workload Category	Annual Production (000's)	Unit Measure	Standard Unit Cost*	Value of Work Produced (000's)
Batch	3,135	MIPS Min	\$0.21	\$653
Interactive	105	MIPS Min	\$0.31	\$33
On-Line	1,376	MIPS Min	\$0.62	\$860
DASD	1,113	MB	\$0.35	\$384
Print	589	K Lines	\$0.33	\$192
Tape Mount	193	Mounts	\$0.58	\$111
Tape Vault	266	Volume	\$0.35	\$94
Total				\$2,327

* based on RD average unit cost to produce each workload unit

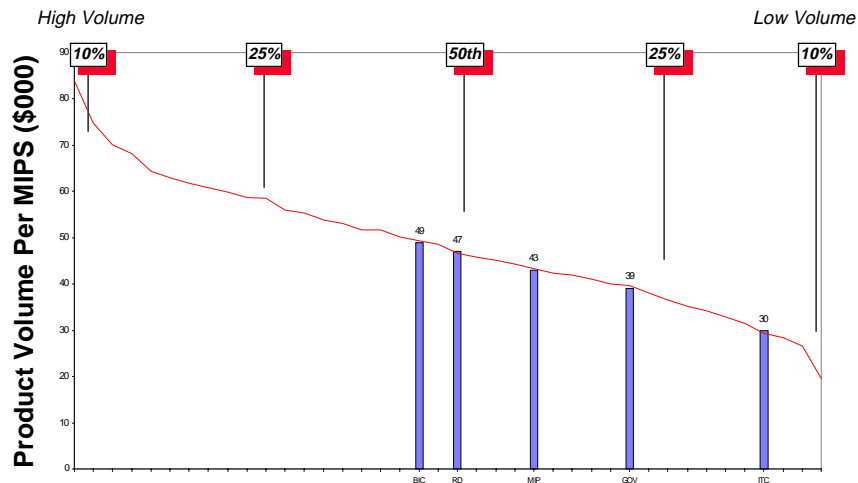
University of VA

JLARC DRAFT—NOT APPROVED

Page 59

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced



Comparison to Full RD Database

University of VA

JLARC DRAFT—NOT APPROVED

Page 60

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Calculation

$$\frac{\text{N}ormalized \text{C}ost}{\text{W}ork \text{P}roduced} = \frac{\$2.4 \text{ Million}}{\$2.3 \text{ Million}} = 1.05$$

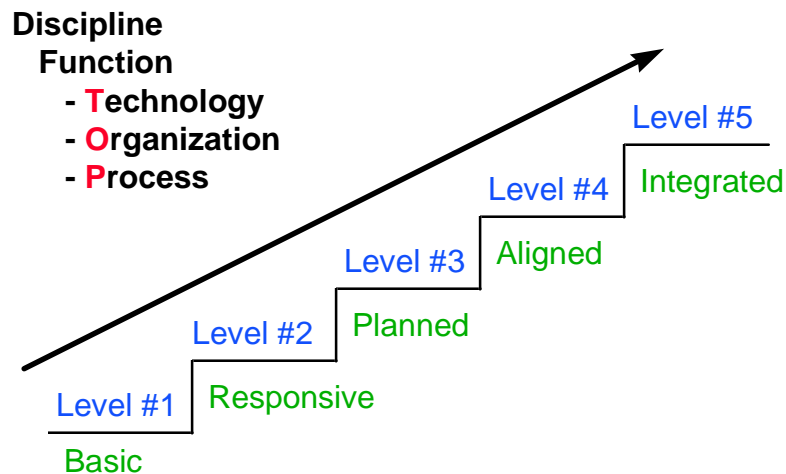
University of VA

JLARC DRAFT—NOT APPROVED

Page 61

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept



University of VA

JLARC DRAFT—NOT APPROVED

Page 62

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept

- ◆ **Technology**
 - Actual platforms, products, services and standards
- ◆ **Organization**
 - The staff, internal and external that bring the technology and process to the customers
- ◆ **Process**
 - Actions or operations that enables the technology for the business

University of VA

JLARC DRAFT—NOT APPROVED

Page 63

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

- ◆ Asset Management:
Procurement
- ◆ Change Management:
Changes/Moves/Adds
- ◆ Customer Service:
Service Level Objectives

University of VA

JLARC DRAFT—NOT APPROVED

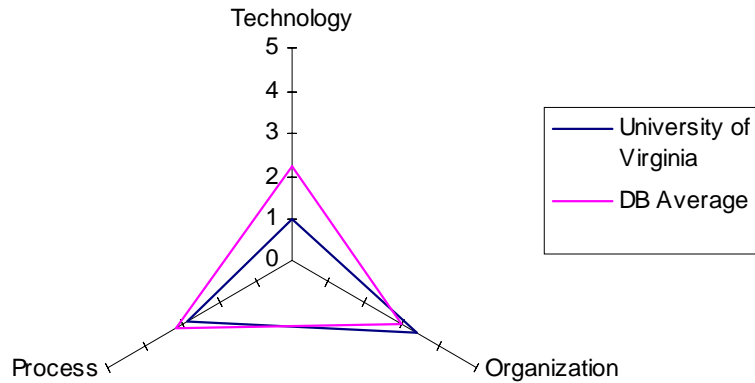
Page 64

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Asset Management—Overall Score 2.4 vs. DB at 2.8

Procurement Overall Averages



University of VA

JLARC DRAFT—NOT APPROVED

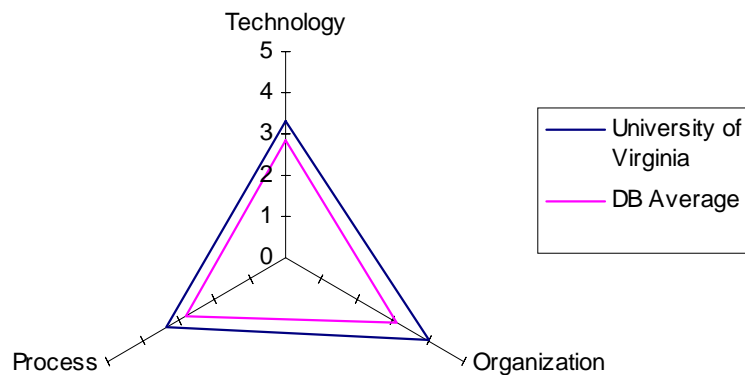
Page 65

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Customer Service—Overall Score 3.6 vs. DB at 2.8

Service Levels Agreements Overall Averages



University of VA

JLARC DRAFT—NOT APPROVED

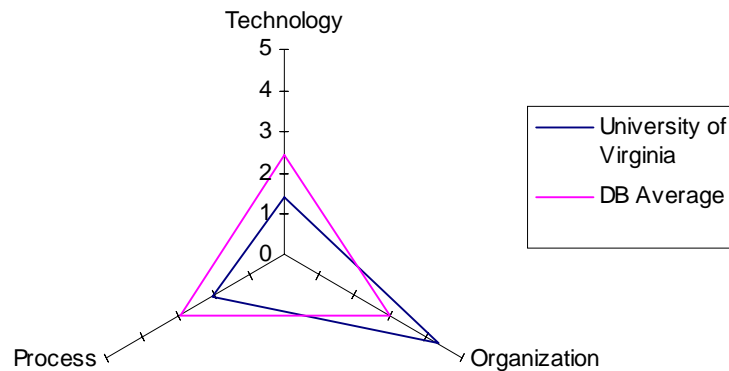
Page 66

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Change Management—Overall Score 2.6 vs. DB at 2.8

Moves/Adds/Changes Overall Averages



University of VA

JLARC DRAFT—NOT APPROVED

Page 67

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions

Data Center Analysis Results

Q & A

University of VA

JLARC DRAFT—NOT APPROVED

REAL DECISIONS
A GARTNER GROUP COMPANY

Gartner Group

- ◆ Premier IT advisory company in the world
- ◆ Provides research, analysis and advice on IT strategies for users, purchasers and vendors of IT products and services
- ◆ Staff of more than 500 of best trained and most tenured analysts in the IT field
- ◆ Breadth and depth of IT services that is unmatched in the industry
- ◆ Understand client's IT needs and provide specific services to match needs
- ◆ Over 23,000 clients representing over 6,700 organizations worldwide

University of VA

JLARC DRAFT—NOT APPROVED

Page 69

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions

- ◆ The premier worldwide provider of IT Continuous Improvement Services
- ◆ Over 20 years of experience in benchmarking services
- ◆ The most comprehensive client database representing more than 600 organizations and over 5,000 strategic quantitative measurements
- ◆ More than 100 analysts representing extensive worldwide business, IT and quantitative science management experience
- ◆ Provides a suite of services that measure the efficiency of IT environments

University of VA

JLARC DRAFT—NOT APPROVED

Page 70

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (4/97)

Aerospace

Allied Signal Aerospace Co.
Daimler-Benz Aerospace Airbus GmbH (GERMANY)
Lockheed Martin
McDonnell Douglas Corporation

Banking

ANZ Banking Group NZ Ltd (NEW ZEALAND)
BBS, Bankenes Betalingsentral A/S (NORWAY)
Banca Commerciale Italiana (ITALY)
Banca Nazionale Del Lavoro (ITALY)
Banca Popolare Etruria E Lanzia (ITALY)
Banco Central Hispano (SPAIN)
Banco Del Caribe SACA (VENEZUELA)
Banco Quilmes (ARGENTINA)
Banco de Boston (ARGENTINA)
Bancomer SA (MEXICO)
Bank of Montreal (CANADA)
Bank of New Zealand (NEW ZEALAND)
Branch Banking & Trust
C.S.O., SpA (ITALY)
Caja de Catalunya (SPAIN)
Carisbo (ITALY)
Cassa di Risparmio di Firenze (ITALY)
Commonwealth Banking Corporation (AUSTRALIA)

Deposit Guaranty National Bank
Hongkong & Shanghai Banking Corp., Ltd (HONG KONG)
ING Facilitair Bedrijf (THE NETHERLANDS)
Istituto Bancario San Paolo Di Torino (ITALY)
Key Services Corporation
Manufacturers & Traders Bank
Michigan National Bank
National Australia Group (SCOTLAND)
National Westminster Bank plc (UNITED KINGDOM)
NationsBank Services
PNC Bank
Plenum Management Consulting GmbH (GERMANY)
Pohlen & Robinson (NEW ZEALAND)
Rochester Community Savings
Royal Bank of Canada (CANADA)
Trust Bank of New Zealand (NEW ZEALAND)

Chemicals/Pharmaceuticals

3M Company
Abbott Laboratories
Bristol-Myers Squibb Company
Ciba-Geigy Corp. NC
Dow Chemical
E.I. Du Pont De Nemours & Co.
Hoechst Marion Roussel, Inc.
Upjohn Company

University of VA

JLARC DRAFT—NOT APPROVED

Page 71

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (4/97)

Consumer Goods/Services

3M Company
ADVO Inc.
AT&T American Transtech
American Greetings
American Trans Tech
Avon Products Inc.
Columbia/HCA HealthCare Corporation
Companhia Siderurgica Nacional (BRAZIL)
D&B
E.I. Du Pont De Nemours & Co.
Elsevier Science Ltd (UNITED KINGDOM)
Glaxo Wellcome Inc.
Grattan plc (UNITED KINGDOM)
Hudson's Bay Company (CANADA)
IBM
ICA Handlarnas AB (SWEDEN)
James River Corporation
Joseph E. Seagram & Sons, Inc.
Kaiser Foundation Health Plan
Kimberly Clark Corporation
Kohler Company
McDonald's Corporation
Mead Corporation

Mercantile Stores
Miller Brewing Company
Nabisco Foods, Inc.
Nordstrom Company
ONCE (SPAIN)
Procter & Gamble Company
Reuters (SWITZERLAND)
St. Paul Company
Touristik Union International (GERMANY)
Whitbread & Company plc (UNITED KINGDOM)

Financial Services

Associates Information Services, Inc.
Board of Trade Clearing Corporation
Brown Brothers Harriman & Co.
Charles Schwab Company
Credit Reference Association of Aust (AUSTRALIA)
Dean Witter, Discover & Co.
Federal Home Loan Mortgage
Fidelity Investments
GE Capital Corporation
Halifax Building Society (UNITED KINGDOM)
Household Finance
ICMA Retirement Corporation

University of VA

JLARC DRAFT—NOT APPROVED

Page 72

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (4/97)

Merrill Lynch
National Savings (UNITED KINGDOM)
Sallie Mae
State Street Bank & Trust
Sun America
TRW Corporation
Transamerica Occidental Life
Visa International, USA

Government and Education

Administrative Office of the Courts
Alberta Govt Tel/ISM Alberta (CANADA)
CA Health & Welfare Data Center
CSI Piemonte (ITALY)
California State Franchise Tax Board
City of Long Beach
City of Seattle
Commonwealth of Pennsylvania
Commonwealth of Virginia
Controllers Office
Dept of Health & Welfare
Gerencia De Informatica (SPAIN)
Government of Newfoundland & Labrador (CANADA)
Human Resources Development (CANADA)
Infocamere (ITALY)

Lincolnshire County Council (UNITED KINGDOM)
Ontario Management Board Secretariat (CANADA)
Orange County of Florida
Palm Beach County
SVB (THE NETHERLANDS)
Serpro (BRAZIL)
St. of FL Dept. of Labor & Employment
State of Alabama
State of Georgia
State of North Carolina
State of Tennessee
State of Utah
Statens Datasentral A/S (NORWAY)
Stephen P. Teale Data Center
Technology Planning & Management Corp.
US Department of State
US Patent & Trademark Office
US Postal Service
Westinghouse Savannah River Company

Insurance

AGF Fenix Sistemias (SPAIN)
Allstate Insurance
Automobile Association (UNITED KINGDOM)
Blue Cross & Blue Shield of Minnesota

University of VA

JLARC DRAFT—NOT APPROVED

Page 73

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (4/97)

Blue Cross/Blue Shield of Maryland
Blue Cross/Blue Shield Mutual of Ohio
Blue Cross/Blue Shield of North Carolina
CIGNA Corporation
Equitable Financial Companies
General American Life Insurance
Group Health Incorporated
Health Care Services Corporation
ITT Hartford Insurance Group
John Hancock
Mutual of Omaha
Nationwide Insurance
Prudential
Shared Services Center
US Fidelity & Guaranty Co.
USAA Information

Manufacturing and Electronics

Acesita (BRAZIL)
American Honda Motor Co., Inc.
Beckman Instruments
British Steel plc (UNITED KINGDOM)
Caterpillar
Companhia Vale do Rio Doce (BRAZIL)
Leviton Manufacturing
NSI SRL (ITALY)
Nissan North America

POSDATA Company Ltd. (KOREA)
Philips Electronics
Pirelli Informatica S.P.A. (ITALY)
Sony Corporation of America
Sun Alliance & Royal Insurance (AUSTRALIA)
USX Corporation
Volkswagen of America, Inc.

Outsourcers

Andersen Consulting Chicago
Datacor/ISM Atlantic Corporation (CANADA)
Finsiel Spa (ITALY)
ISM Corporation (CANADA)
ISM SK (CANADA)
National Computer Systems (SINGAPORE)
NewTel Information Solutions Ltd. (CANADA)
Origin B.V. (THE NETHERLANDS)
Telenor Teamco A/S (NORWAY)

Petroleum and Gas

Amerada Hess
Amoco Corporation
Arco Exploration & Production Tech
Chevron Information Technology Company
Shell Services Co.

University of VA

JLARC DRAFT—NOT APPROVED

Page 74

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (497)

Telecommunications

AT&T Universal Card Services Corp.
AirTouch Cellular
Alberta Govt Tel/ISM Alberta (CANADA)
Alcatel Bell Telephone (BELGIUM)
Alcatel CIT (FRANCE)
Alcatel SEL AG (GERMANY)
Alcatel SESA (SPAIN)
Bell Atlantic NYNEX Mobile, Inc.
Bell Sygma (CANADA)
BellSouth Information Systems
Ericsson Radio Systems
Ericsson Telecomunicazioni SpA (ITALY)
GTE - US
GTE Telephone Operations HQ
MCI Communications Corporation
NYNEX
SaskTel (CANADA)
TPI (SPAIN)
Telecom A/S (DENMARK)
Telecom Australia (AUSTRALIA)
Telus (CANADA)
Telus/Edmonton Telephone (CANADA)

Transportation

CSX Technology
Caliber Technology, Inc.
Canadian National Railways (CANADA)
Ente Ferrovie Dello Stato (ITALY)
Galileo International
RATP (FRANCE)
Tranzrail New Zealand Limited (NEW ZEALAND)

Utilities

AGL Gas Company Ltd. (AUSTRALIA)
American Electric Power
Boston Edison
British Gas Transco (UNITED KINGDOM)
CESP-Cia Energetica do Estado de S.P. (BRAZIL)
CIA Sevillana de Electricidad (SPAIN)
CPFL (BRAZIL)
Canadian Utilities Ltd. (CANADA)
Carolina Power & Light
Central & South West Services
China Light & Power Co., Ltd. (HONG KONG)
Columbia Gas System Services
Commonwealth Edison
Companhia De Telefones Do Brasil (BRAZIL)

University of VA

JLARC DRAFT—NOT APPROVED

Page 75

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients (4/97)

Duke Power
ENEL SpA (ITALY)
Edinfor - Sistemas Informaticos, s.a. (PORTUGAL)
Edison International
Energie-Versorgung Schwaben AS (GERMANY)
Entergy Systems
F.E.C.S.A. (SPAIN)
Florida Power Corporation
Hydro-Quebec (CANADA)
Illinois Power
Integral Energy (AUSTRALIA)
Kentucky Utilities Company
LA Dept. of Water & Power
North West Water Ltd. (UNITED KINGDOM)
Northeast Utilities
Northern Ireland Electricity plc (UNITED KINGDOM)
Ontario Hydro (CANADA)
Seaboard plc (UNITED KINGDOM)
Southern Company Services
Texas Utilities
Utilicorp
Virginia Power

University of VA

JLARC DRAFT—NOT APPROVED

Page 76

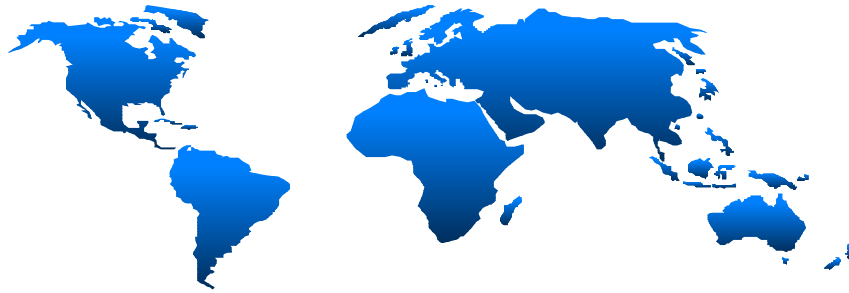
REAL DECISIONS
A GARTNER GROUP COMPANY

Virginia Tech Data Center



Virginia Tech

Data Center Analysis



A Comparative Benchmark Annual Report

REALDECISIONS
A GARTNER GROUP COMPANY

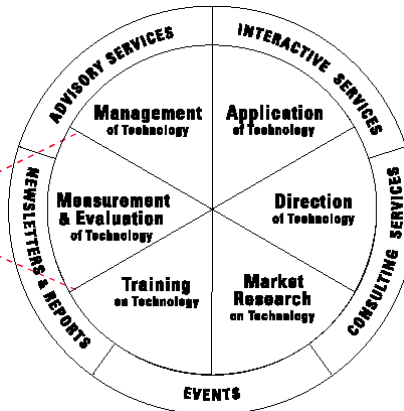
Meeting Agenda

- ◆ Introduction and Project Guidelines
- ◆ Summary of Overall Study Results
- ◆ Specific Areas of Review and Analysis
 - Annual Operating Expenditures
 - Staffing Levels and Costs
 - Customer Work Produced
- ◆ TOP Model Analysis
- ◆ Q & A

Gartner Group and Real Decisions Core Areas of IT Expertise

- ♦ By combining the expertise of both Gartner Group and Real Decisions, we are ready to serve your IT advisory needs for today and tomorrow.

Real Decisions' Continuous Improvement Services



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 3

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions Service Deliverables

Real Decisions services provide for continuous evaluation and improvement of IT contribution to your business



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 4

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Scope of Study

- ◆ Fiscal 1996 Data Center Efficiency Analysis
 - Study period from July 1995 through June 1996.
 - IBM MVS and VM mainframe environment.
 - Includes peripheral DASD, Tape Storage and Print.
 - For comparison, the Virginia Tech weighted average capacities of 72 MIPS and 296 GB of DASD are used.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 5

REAL DECISIONS
A GARTNER GROUP COMPANY

Project Guidelines

Profile of Comparison Groups

Detail

- ◆ MIPS
 - Fifteen installations with an installed MIPS size of between 61 and 98 MIPS. The average size is 79 MIPS.

Summary

- ◆ Government
 - Five Installations with an average capacity of 80 MIPS
- ◆ Best in Class (BIC)
 - Five installations with an average installed capacity of 80 MIPS.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 6

REAL DECISIONS
A GARTNER GROUP COMPANY

Best in Class

Criteria

Data centers with installed computer capacities under 100 MIPS performing general-purpose processing and whose cost-efficiency ratings are less than 1.0

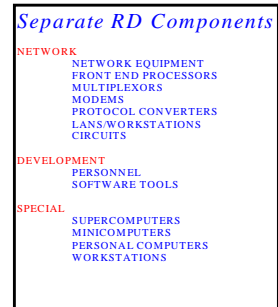
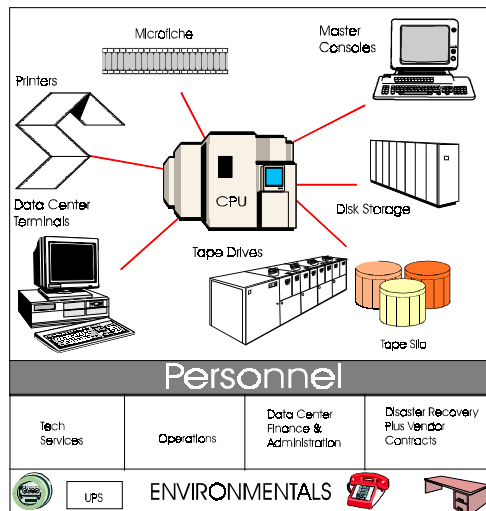
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 7

REAL DECISIONS
A GARTNER GROUP COMPANY

Consensus Data Center Model



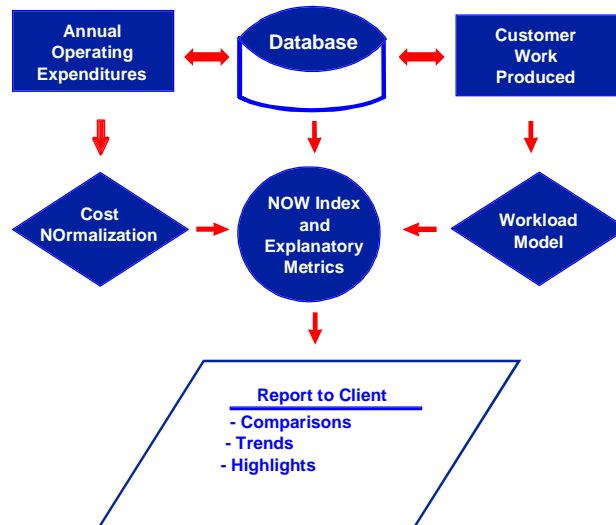
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 8

REAL DECISIONS
A GARTNER GROUP COMPANY

Overview: Data Center Evaluation



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 9

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Normalized Cost

Work Produced

A single index to measure, rate and compare
unit cost-efficiency across the database

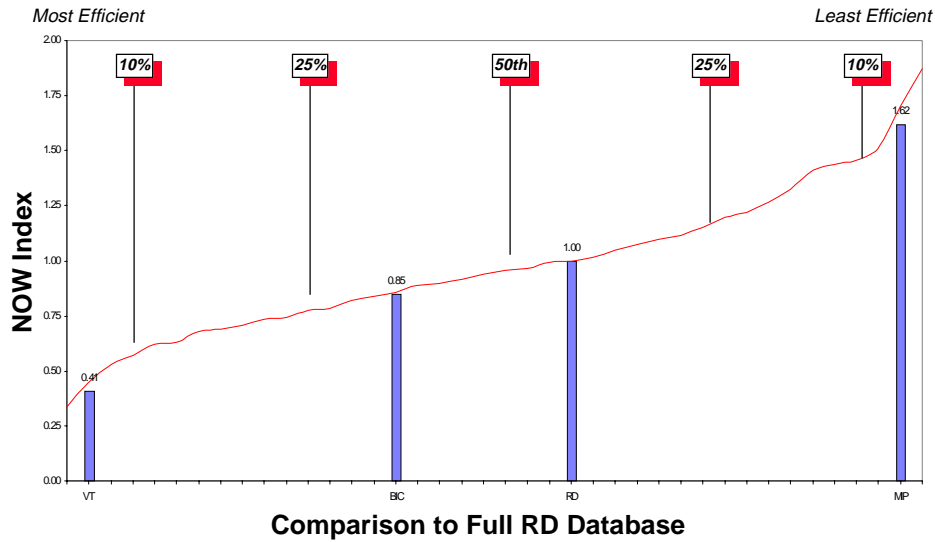
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 10

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



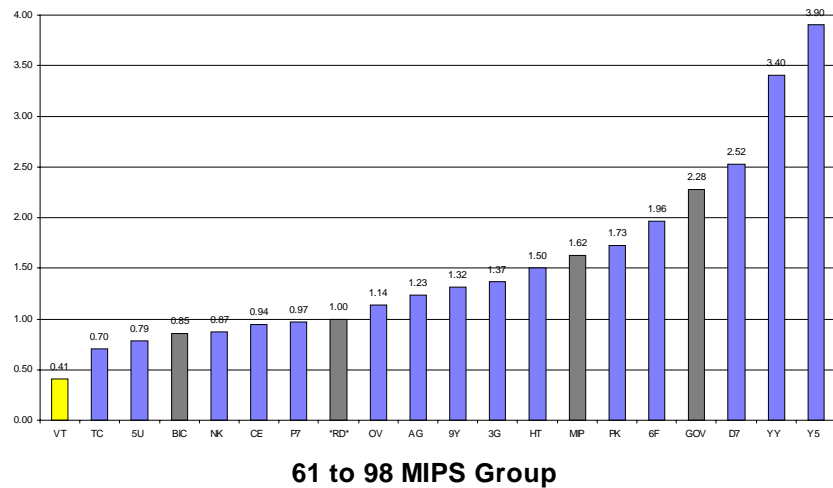
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 11

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Comparison



Virginia Tech

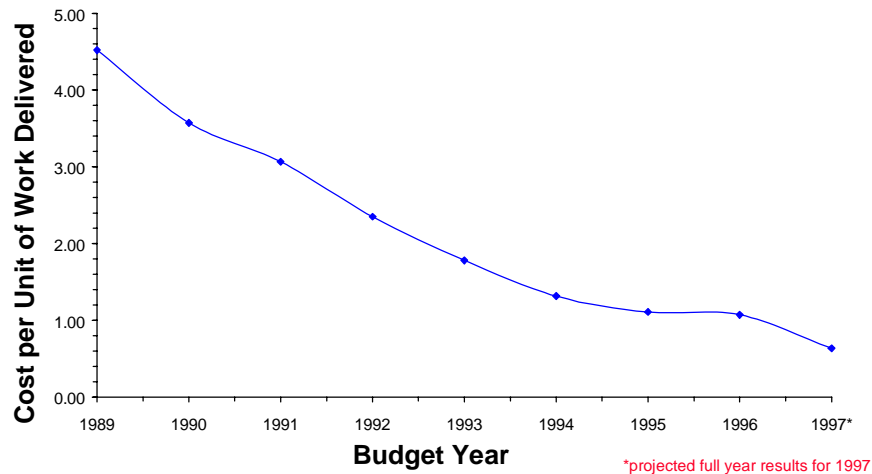
JLARC DRAFT—NOT APPROVED

Page 12

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index

Annual Decrease of 23%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 13

REAL DECISIONS
A GARTNER GROUP COMPANY

Results of Analysis

Overview

- ◆ For the study period, Virginia Tech's overall data center spending per MIPS is 76% lower than the MIPS peer group members on average.
- ◆ Total value of the work produced per MIPS is 37% higher than the MIPS peer group.
- ◆ Virginia Tech has a slight advantage versus the current database which contains a majority of 1995 data. With an average database improvement of 20% per year, Virginia Tech compared to a 1996 data would result in an estimated NOW Index closer to 0.45.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 14

REAL DECISIONS
A GARTNER GROUP COMPANY

Detailed Comparison

- ◆ Annual Operating Expenditures
- ◆ Staffing
- ◆ Value of Work Produced

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 15

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

- ◆ “Consensus” Budget Model
- ◆ Standardized Cost Definition
- ◆ Categorization of Headcount and Costs

A rigorous cost normalization methodology used to establish a
“level playing field”

Virginia Tech

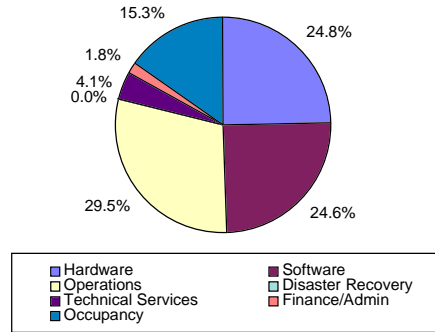
JLARC DRAFT—NOT APPROVED

Page 16

REAL DECISIONS
A GARTNER GROUP COMPANY

RD Budget Model (\$000)

Budget Category	Normalized Costs
Hardware	\$430
Software	\$427
Operations	\$512
Disaster Recovery	\$0
Technical Services	\$71
Finance/Admin	\$30
Occupancy	\$265
Total	\$1,735



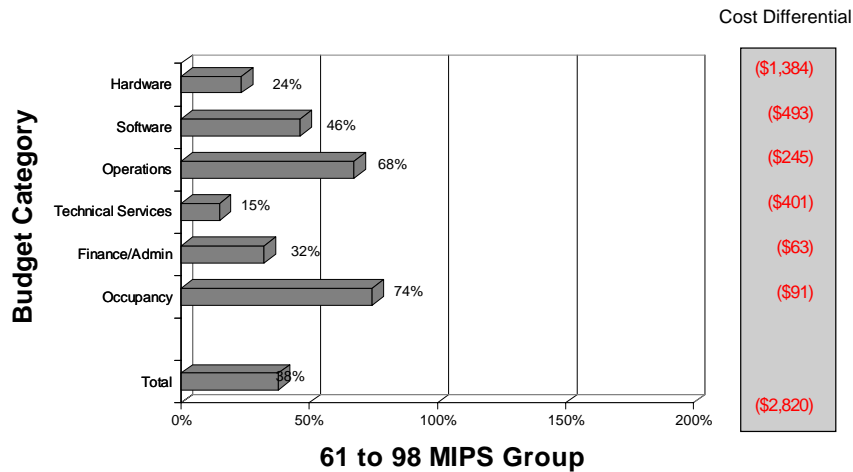
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 17

REAL DECISIONS
A GARTNER GROUP COMPANY

Cost per Installed MIPS (\$000)



Virginia Tech

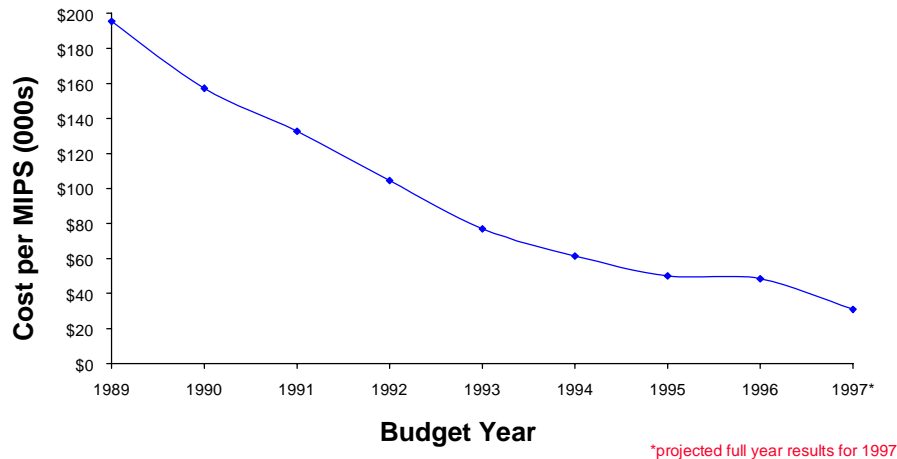
JLARC DRAFT—NOT APPROVED

Page 18

REAL DECISIONS
A GARTNER GROUP COMPANY

Total Cost per MIPS

Annual Decrease of 22%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 19

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Definitions

CPU—Processor complexes including processor unit, controllers, power & coolant units, power units plus upgrades, expanded storage changes, local and remote channel-to-channel adapters and coupling facility.

System Consoles—System operation consoles including master consoles and sub-system monitors, generally located in control room.

Disk Storage—All disk including 3380s, 3390s (or equivalents) but excluding optical disk or mass storage devices.

Tape Storage—Reel and cartridge drives, tape controllers, silos and automatic tape loaders.

Output Hardware—Printers, bursters, decollaters, roll paper feeds and microfiche equipment but excludes sorters or inserters.

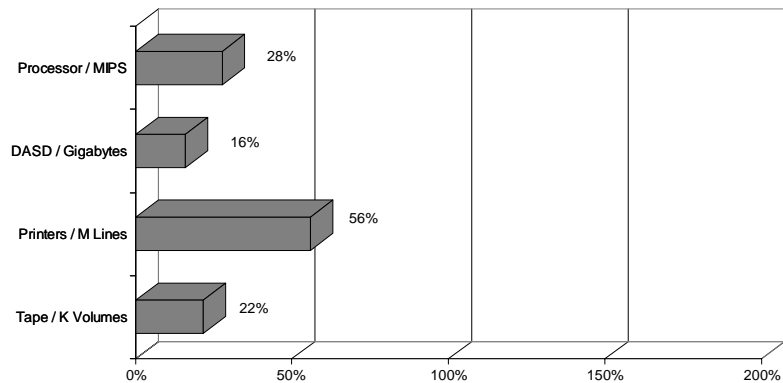
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 20

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Costs



61 to 98 MIPS Group

Virginia Tech

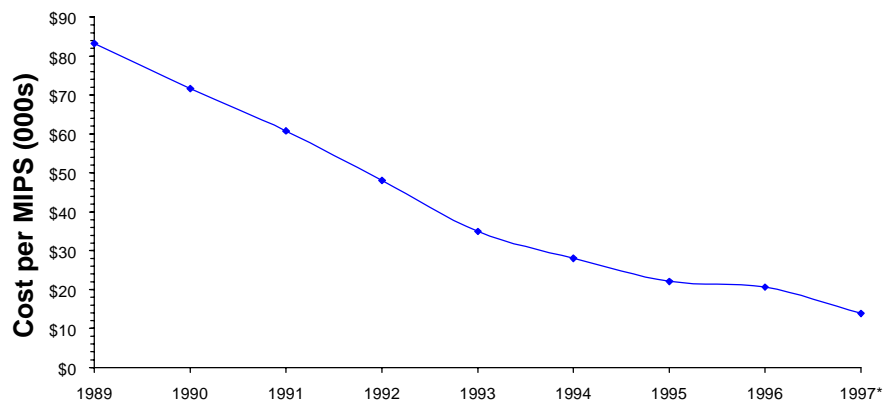
JLARC DRAFT—NOT APPROVED

Page 21

REAL DECISIONS
A GARTNER GROUP COMPANY

Hardware Cost per MIPS

Annual Decrease of 21%



Budget Year

*projected full year results for 1997

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 22

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Hardware (25% of RD consensus budget)

- ◆ Hardware costs are well below the peer group averages. All the hardware has been amortized with a residual value of zero.
- ◆ Maintenance \$430K is the only cost associated with the hardware. Maintenance costs are 80% to 111% higher than the peer groups. The higher maintenance costs are consistent with the older hardware.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 23

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Definitions

Operating System:

Change Management
Data Management
Output Management
Production Management
Security Management
System Management

Excluded Software:

Development
Network
Applications

Subsystem System:

4GL
3GL
Office Products

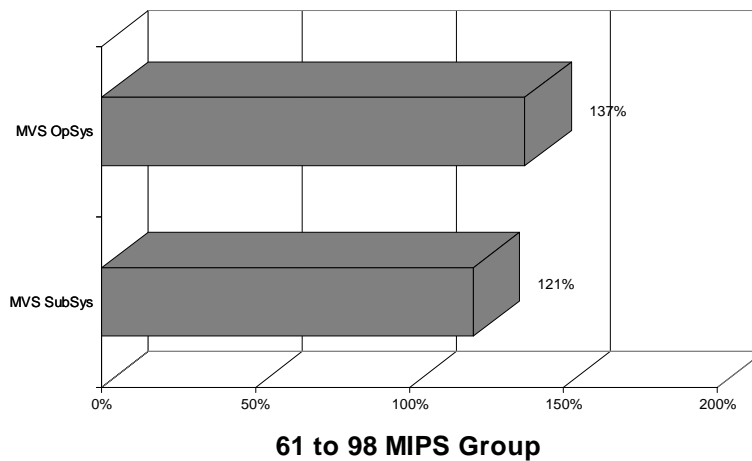
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 24

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Costs



Virginia Tech

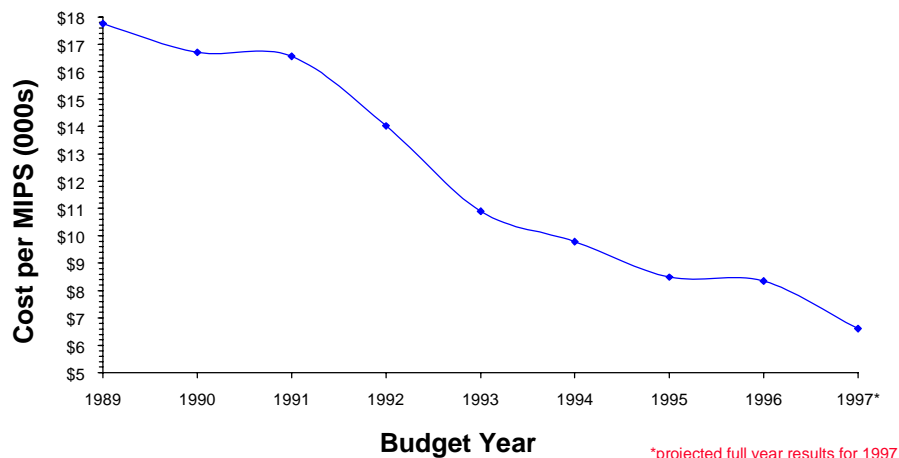
JLARC DRAFT—NOT APPROVED

Page 25

REAL DECISIONS
A GARTNER GROUP COMPANY

Software Cost per MIPS

Annual Decrease of 12%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 26

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Software (25% of RD consensus budget)

- ♦ Overall software costs of \$427K are also below all peer group average.
- ♦ The operation systems software is also not at current levels due to the lack of new applications for the mainframe environment.
- ♦ VM software supports most of the workload and is keeping the overall software costs lower than peer averages on a per MIPS basis. VM costs of \$85K supports 44 MIPS.
- ♦ MVS software costs are higher than peer group averages. MVS costs of \$342K supports 27 MIPS.

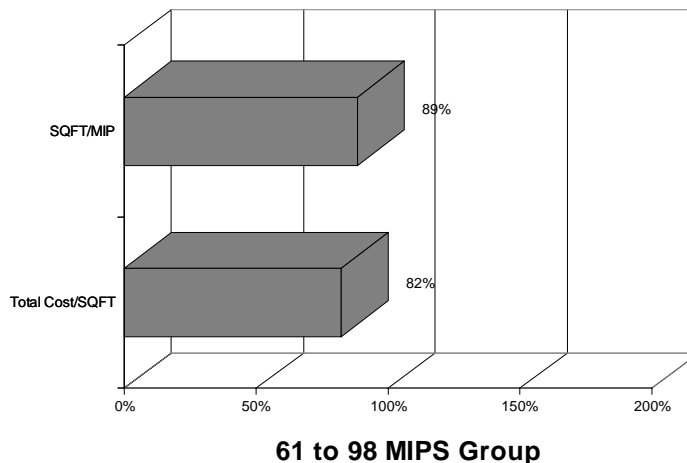
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 27

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Costs



Virginia Tech

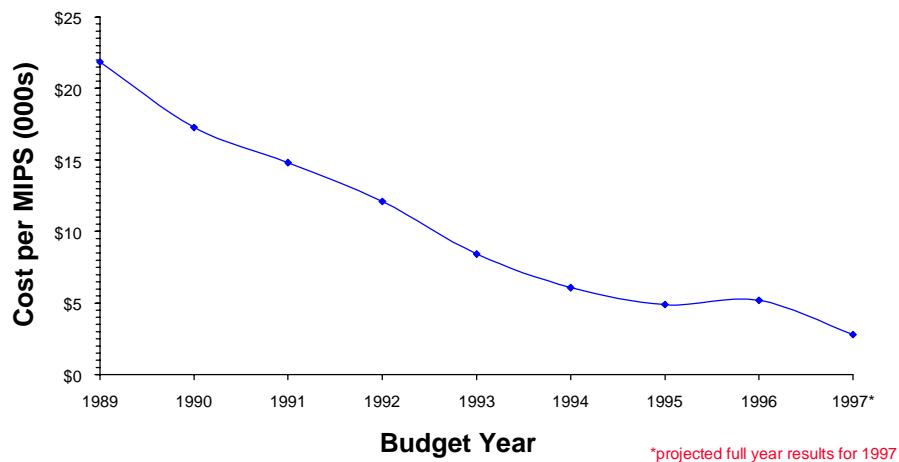
JLARC DRAFT—NOT APPROVED

Page 28

REAL DECISIONS
A GARTNER GROUP COMPANY

Occupancy Cost per MIPS

Annual Decrease of 23%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 29

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Fixed Cost Review

Occupancy (15% of RD consensus budget)

- ◆ Occupancy costs of \$265K are lower overall than the peer group averages due to both a lower square foot cost and less square feet per MIPS than the peer group averages.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 30

REAL DECISIONS
A GARTNER GROUP COMPANY

Staffing Levels and Costs

- ◆ Staffing Categories
 - Operations
 - Technical Services
- ◆ Headcount and per-capita comparisons

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 31

REAL DECISIONS
A GARTNER GROUP COMPANY

Headcount Summary

Operations	VT	Tech Services	VT
Management	0.5	Management	0.0
Shift Ops	6.5	Sys Prog	0.1
Help Desk	0.0	Security	0.1
Output Serv	3.0	Perf Meas	0.9
Prod Control	1.8		
<hr/>		<hr/>	
Total	11.8	Total	1.1
<hr/>		<hr/>	
Cost/Person	\$43,524		\$64,102

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 32

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Operations

Management—(Managing three or more of the following functions)

Shift Operations

- System Operations
- Operations Support
- Tape Operations

Help Desk

Output Services

- Print Operations
- Fiche Operations

Production Control

Virginia Tech

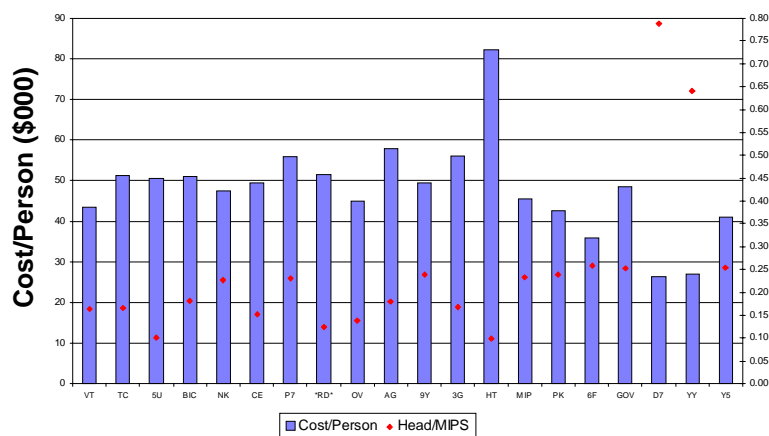
JLARC DRAFT—NOT APPROVED

Page 33

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Staff Comparison

Staffing Levels and Cost Per Person



61 to 98 MIPS Group

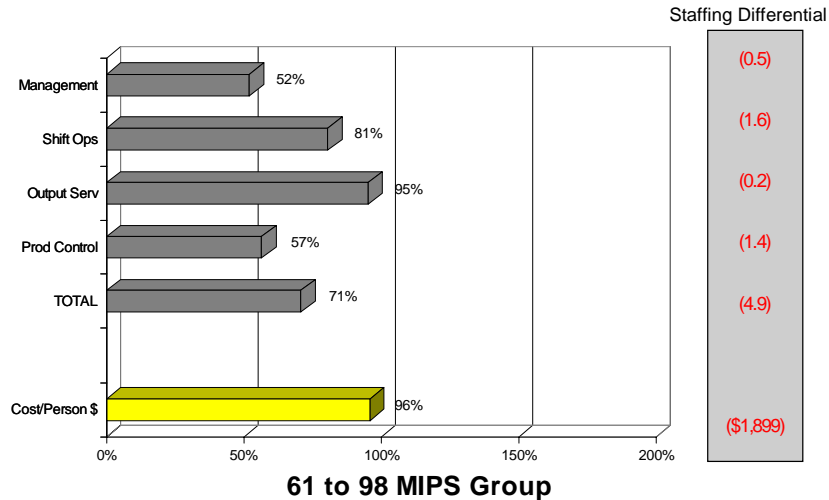
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 34

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Headcount per MIPS



Shift Ops: System Operations, Operations Support, Tape Operations
Output Serv: Print Operations, Fiche Operations

Virginia Tech

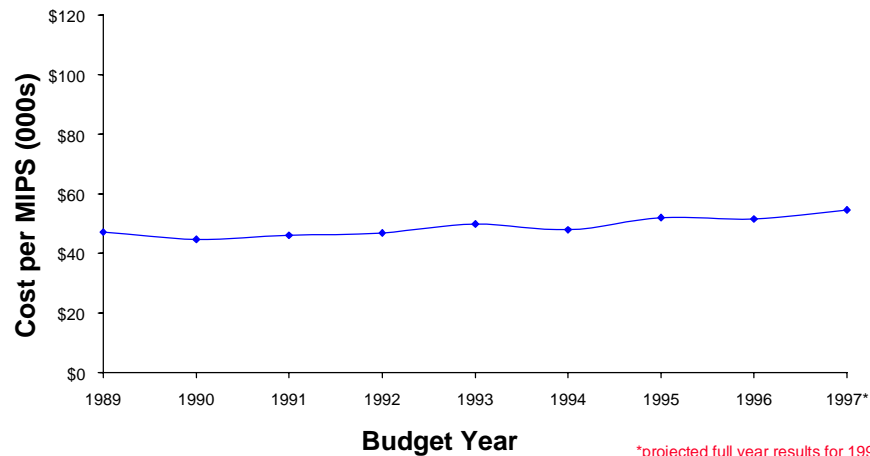
JLARC DRAFT—NOT APPROVED

Page 35

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per Head

Annual Increase of 2%



Virginia Tech

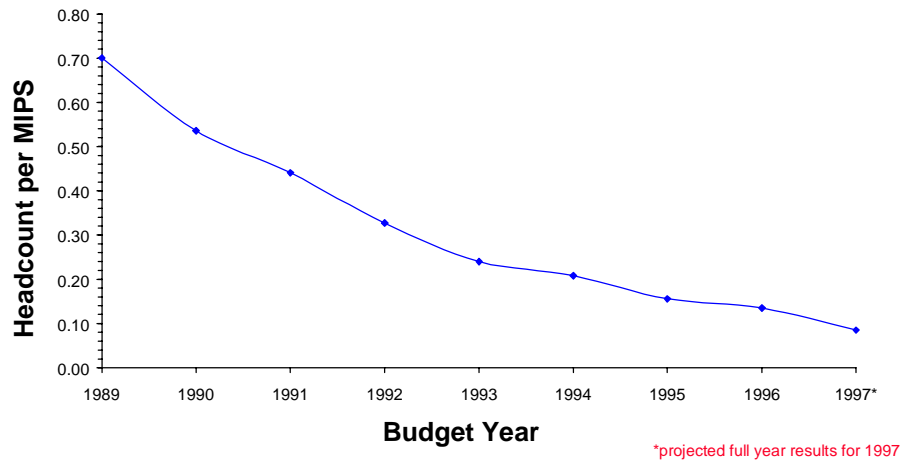
JLARC DRAFT—NOT APPROVED

Page 36

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Heads per MIPS

Annual Decrease of 26%



Virginia Tech

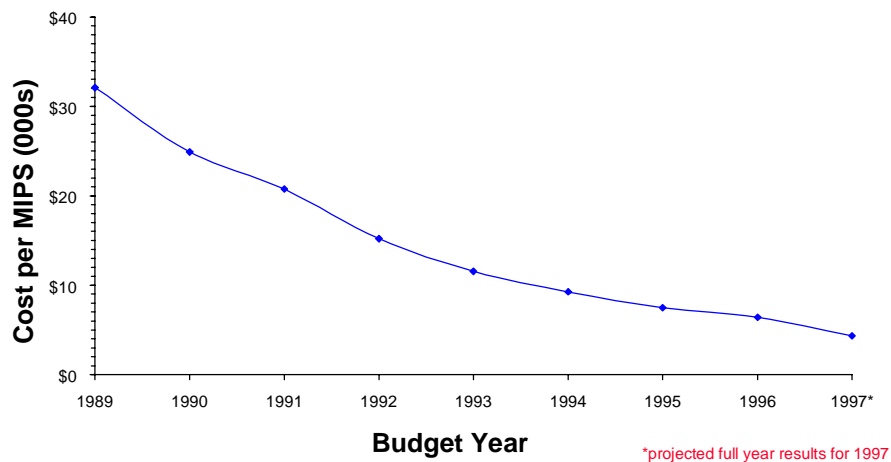
JLARC DRAFT—NOT APPROVED

Page 37

REAL DECISIONS
A GARTNER GROUP COMPANY

Operations Cost per MIPS

Annual Decrease of 25%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 38

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Operations (30% of RD consensus budget)

- ◆ Overall operations staffing costs of \$512K is 20% to 30% below the peer group averages.
- ◆ Operations staffing of 12 is also 10% to 35% below the peer groups.
- ◆ Both the lower staffing level and the lower cost per person contribute to the lower overall operations cost.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 39

REAL DECISIONS
A GARTNER GROUP COMPANY

Personnel Definitions

Technical Services

Management—(Managing three or more of the following functions)

System Programmers

- Operating System Support
- Subsystem Support
- Internal Systems Support

Security

Performance Measurement

- Performance Analysis
- Capacity Planning
- Storage Management

Virginia Tech

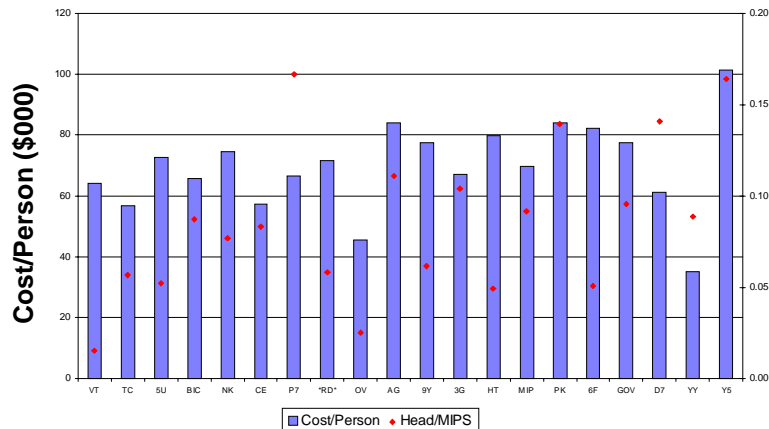
JLARC DRAFT—NOT APPROVED

Page 40

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Staff Comparison

Staffing Levels and Cost Per Person



61 to 98 MIPS Group

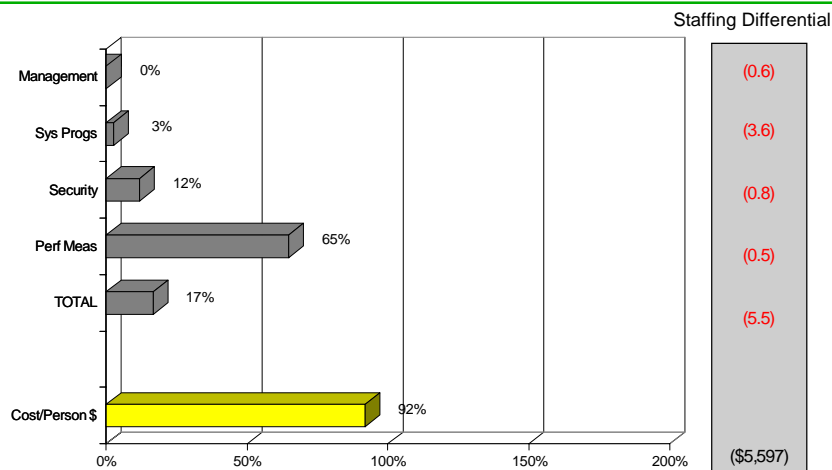
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 41

REAL DECISIONS
A GARTNER GROUP COMPANY

Tech Services Headcount per MIPS



61 to 98 MIPS Group

Sys Progs: Operating System Support, Subsystem Support, Internal Systems Support
Perf Meas: Performance Analysis, Capacity Planning, Storage Management

Virginia Tech

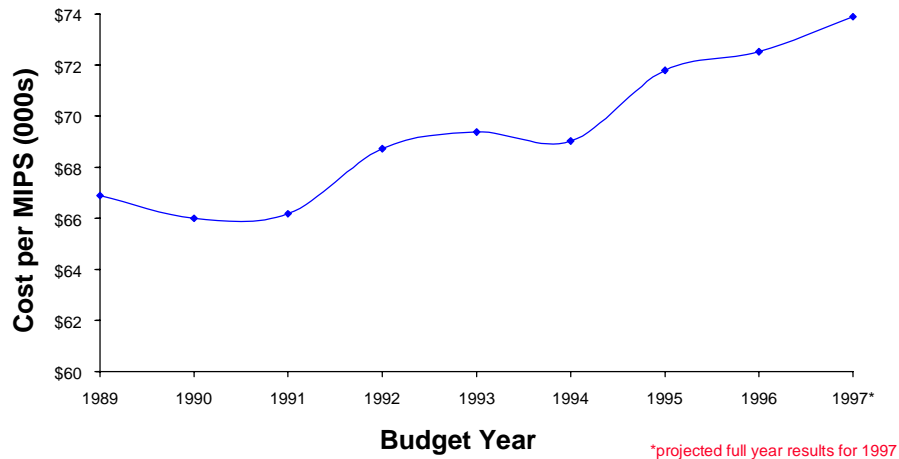
JLARC DRAFT—NOT APPROVED

Page 42

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per Head

Annual Increase of 1%



Virginia Tech

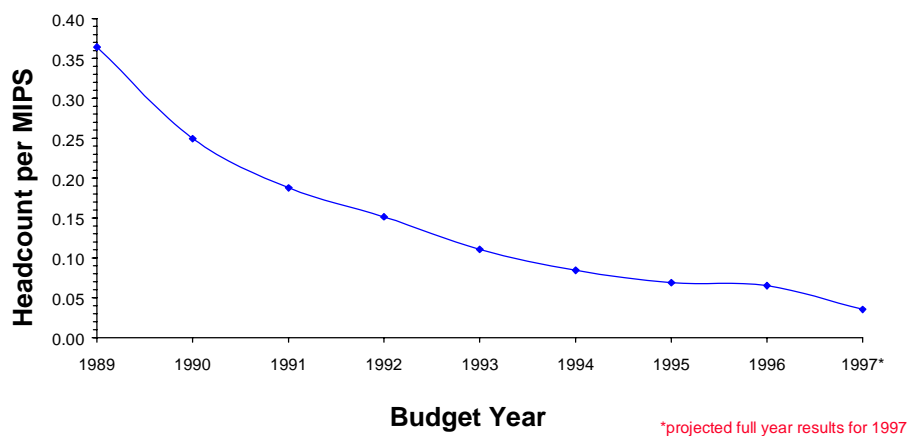
JLARC DRAFT—NOT APPROVED

Page 43

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Heads per MIPS

Annual Decrease of 30%



Virginia Tech

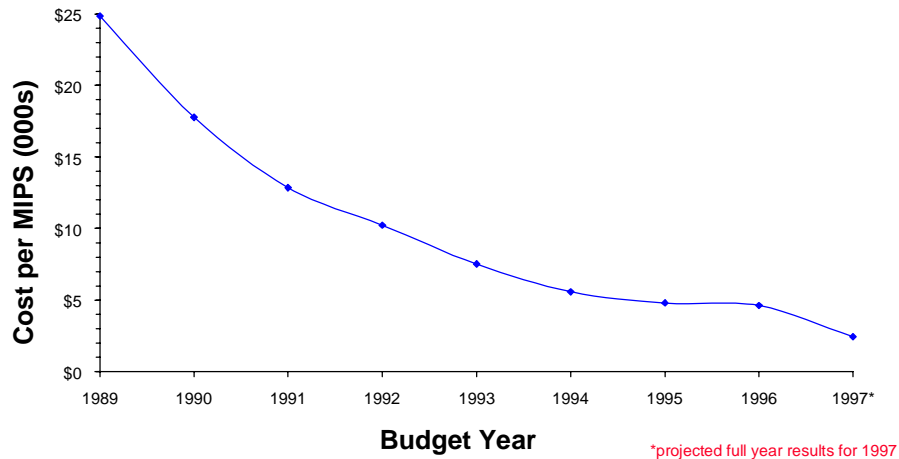
JLARC DRAFT—NOT APPROVED

Page 44

REAL DECISIONS
A GARTNER GROUP COMPANY

Technical Services Cost per MIPS

Annual Decrease of 30%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 45

REAL DECISIONS
A GARTNER GROUP COMPANY

Annual Operating Expenditures

Staffing/Cost Review

Technical Services (4% of RD consensus budget)

- ◆ Overall technical services staffing costs of \$71K is 85% below the peer group averages.
- ◆ Technical services staffing of 1 is also well below the peer groups.
- ◆ The overall compensation level of \$64,100 per person is slightly below peer group averages.
- ◆ The major support effort is supporting the older technology DASD and data recovery.
- ◆ The minimum software maintenance requirement is due to a stable XA operating system and no new applications.

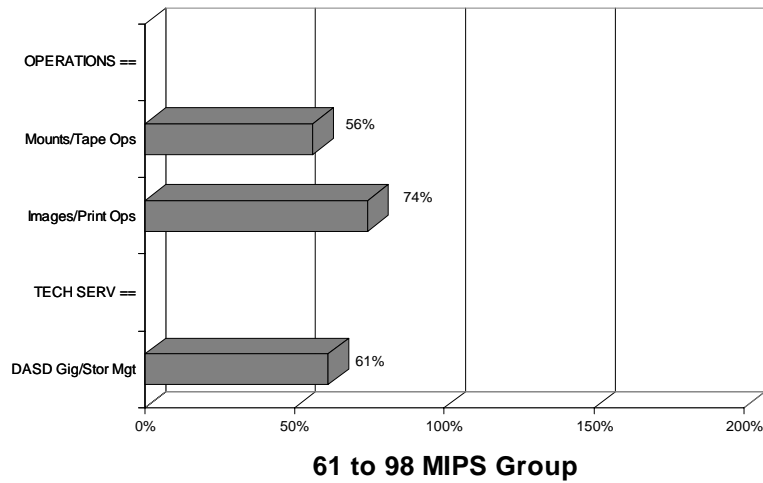
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 46

REAL DECISIONS
A GARTNER GROUP COMPANY

Productivity Comparison



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 47

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

- ◆ Capacity Utilization Levels
- ◆ Workload Model Review

Customer Demand Processed by Installed Capacity

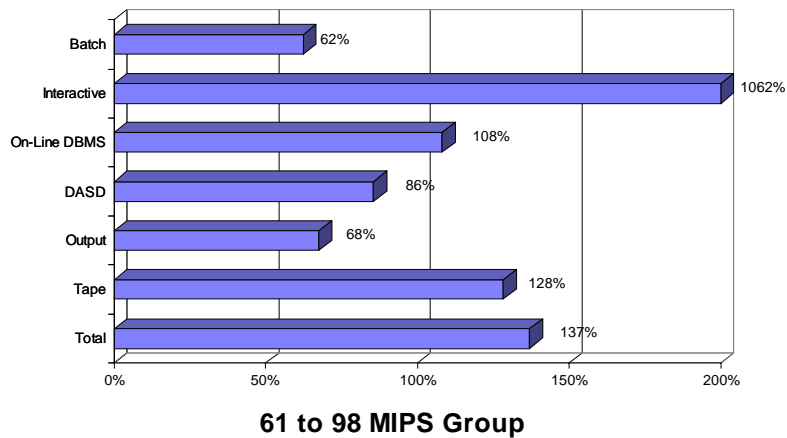
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 48

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced per MIPS



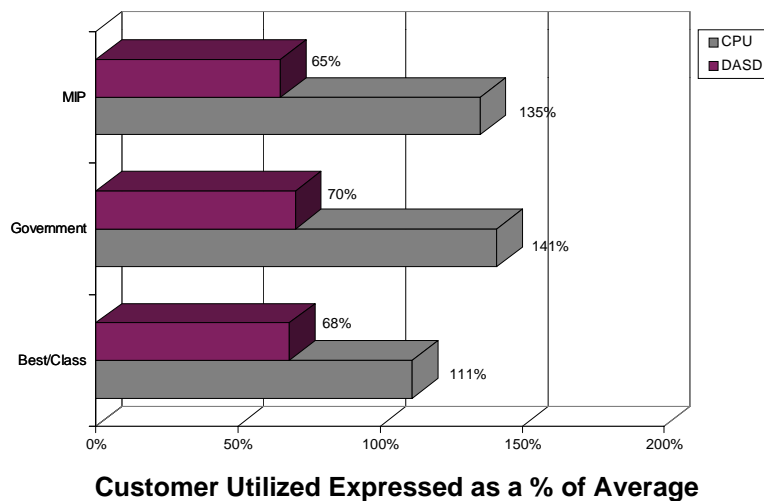
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 49

REAL DECISIONS
A GARTNER GROUP COMPANY

Capacity Utilization



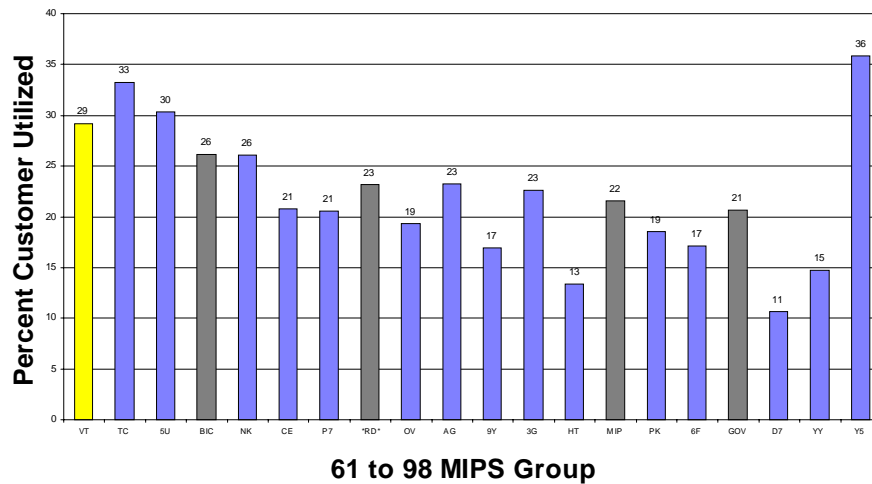
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 50

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS



Virginia Tech

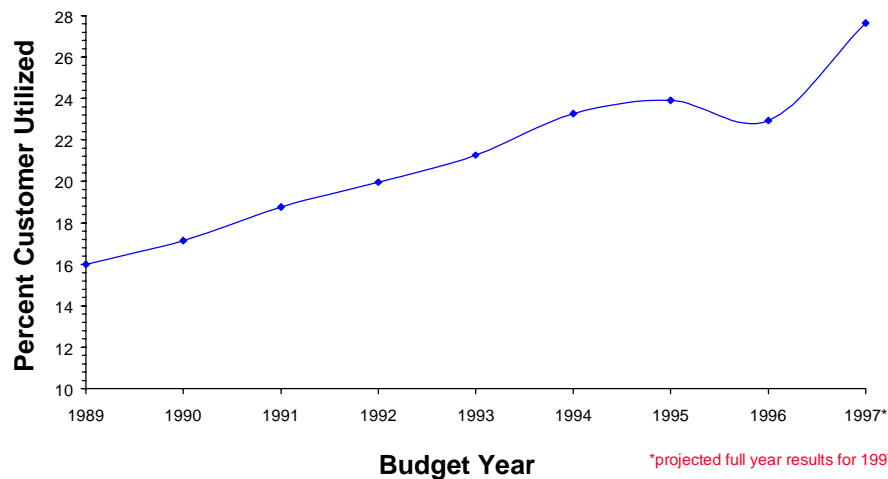
JLARC DRAFT—NOT APPROVED

Page 51

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer MIPS

Annual Increase of 6%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 52

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

CPU

- ♦ Customer CPU utilization of 30% is being compared on a 7 X 24 operation..
- ♦ CPU workload profile: Prime 80%, non-prime 14%, weekends 6%. VM/CMS represents 56% of the total workload.

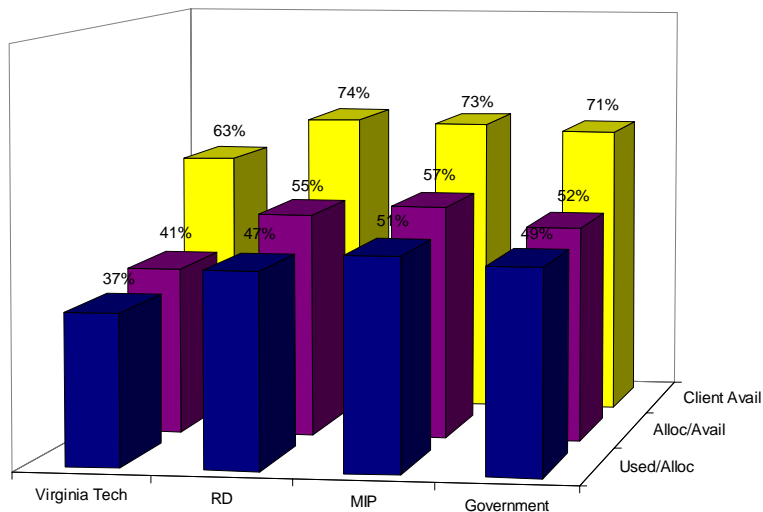
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 53

REAL DECISIONS
A GARTNER GROUP COMPANY

MVS Client DASD Comparison



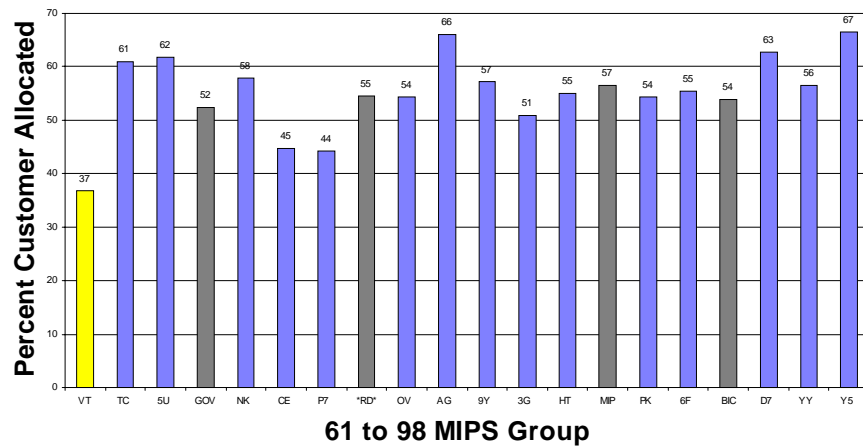
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 54

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD



Virginia Tech

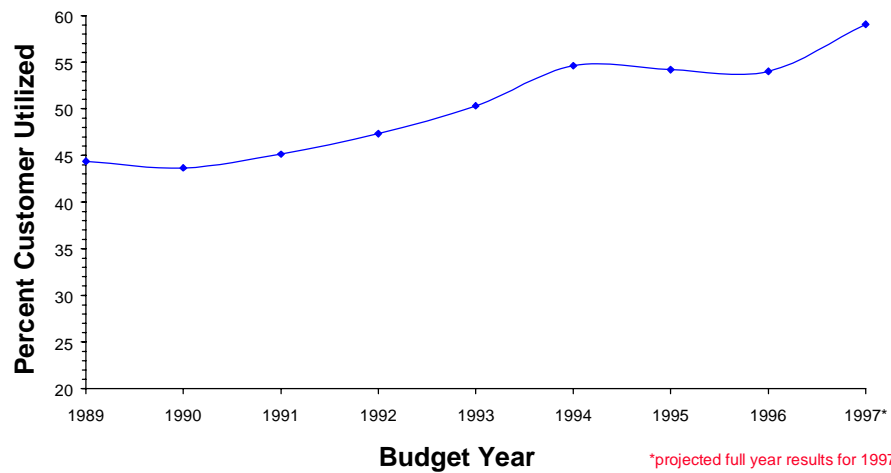
JLARC DRAFT—NOT APPROVED

Page 55

REAL DECISIONS
A GARTNER GROUP COMPANY

Percent Customer DASD

Annual Increase of 4%



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 56

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Capacity Utilization

DASD

- ◆ DASD utilization of 37% is well below the other peer groups overall and 35% below the MIPS peer group average.
- ◆ The high number of disk recoveries is consistent with the old disk technology.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 57

REAL DECISIONS
A GARTNER GROUP COMPANY

Workload Comparison

Customer Volumes

- ◆ Overall the volume of customer work produced is above the peer group averages due to the abnormally high VM/CMS interactive workload for the installed CPU capacity.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 58

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced

In a manner similar to the calculation of the GDP, Real Decisions measures the annual production of RD member data centers. This technique aggregates the total work produced based on the relative unit cost for delivering individual services.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 59

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced—Total

Workload Category	Annual Production (000's)	Unit Measure	Standard Unit Cost*	Value of Work Produced (000's)
Batch	3,037	MIPS Min	\$0.21	\$648
Interactive	6,321	MIPS Min	\$0.32	\$2,032
On-Line	1,596	MIPS Min	\$0.48	\$760
DASD	1,308	MB	\$0.33	\$430
Print	603	K Lines	\$0.33	\$197
Tape Mount	166	Mounts	\$0.58	\$96
Tape Vault	168	Volume	\$0.35	\$59
Total				\$4,222

* based on RD average unit cost to produce each workload unit

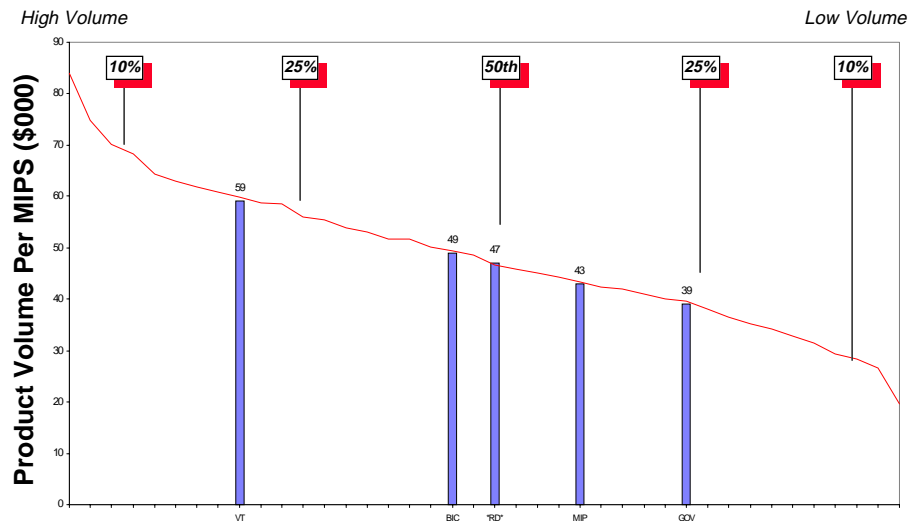
Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 60

REAL DECISIONS
A GARTNER GROUP COMPANY

Value of Work Produced



Virginia Tech

Comparison to Full RD Database

JLARC DRAFT—NOT APPROVED

Page 61

REAL DECISIONS
A GARTNER GROUP COMPANY

NOW Index Calculation

Normalized Cost \$1.7 Million

Work Produced \$4.2 Million

NOW Index = 0.41

Virginia Tech

JLARC DRAFT—NOT APPROVED

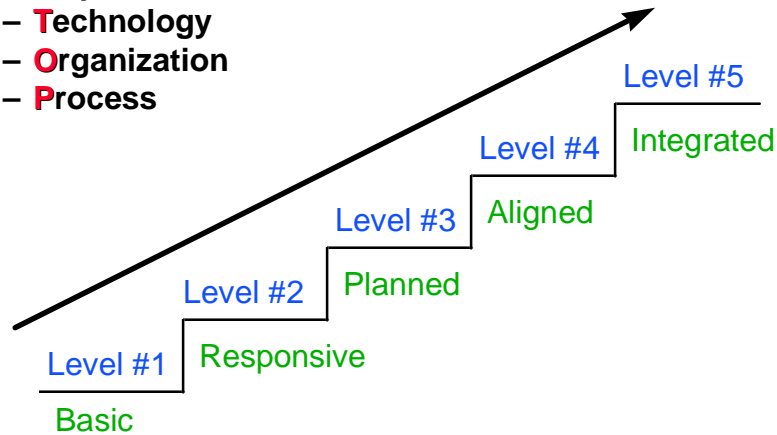
Page 62

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept

Discipline Function

- **T**echnology
- **O**rganization
- **P**rocess



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 63

REAL DECISIONS
A GARTNER GROUP COMPANY

The TOP Model Development Stage Concept

◆ **T**echnology

- Actual platforms, products, services and standards

◆ **O**rganization

- The staff, internal and external that bring the technology and process to the customers

◆ **P**rocess

- Actions or operations that enables the technology for the business

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 64

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

- ◆ Asset Management:
Procurement
- ◆ Change Management:
Changes/Moves/Adds
- ◆ Customer Service:
Service Level Objectives

Virginia Tech

JLARC DRAFT—NOT APPROVED

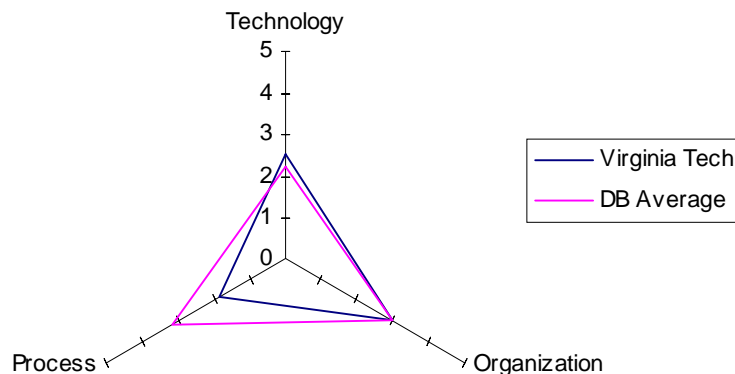
Page 65

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Asset Management—Overall Score 2.5 vs. DB at 2.8

Procurement Overall Averages



Virginia Tech

JLARC DRAFT—NOT APPROVED

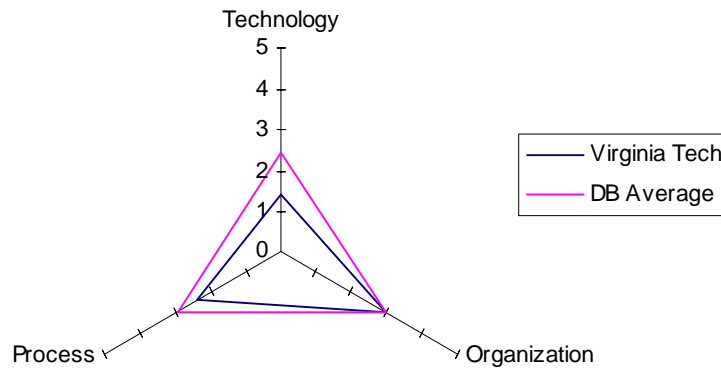
Page 66

REAL DECISIONS
A GARTNER GROUP COMPANY

Strategies for Improved Performance

Change Management—Overall Score 2.3 vs. DB at 2.8

Moves/Adds/Changes Overall Averages



Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 67

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions

Data Center Analysis Results

Q & A

Virginia Tech

JLARC DRAFT—NOT APPROVED

REAL DECISIONS
A GARTNER GROUP COMPANY

Gartner Group

- ◆ Premier IT advisory company in the world
- ◆ Provides research, analysis and advice on IT strategies for users, purchasers and vendors of IT products and services
- ◆ Staff of more than 500 of best trained and most tenured analysts in the IT field
- ◆ Breadth and depth of IT services that is unmatched in the industry
- ◆ Understand client's IT needs and provide specific services to match needs
- ◆ Over 23,000 clients representing over 6,700 organizations worldwide

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 69

REAL DECISIONS
A GARTNER GROUP COMPANY

Real Decisions

- ◆ The premier worldwide provider of IT Continuous Improvement Services
- ◆ Over 20 years of experience in benchmarking services
- ◆ The most comprehensive client database representing more than 600 organizations and over 5,000 strategic quantitative measurements
- ◆ More than 100 analysts representing extensive worldwide business, IT and quantitative science management experience
- ◆ Provides a suite of services that measure the efficiency of IT environments

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 70

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Aerospace

Allied Signal Aerospace Co.
Daimler-Benz Aerospace Airbus GmbH (GERMANY)
Lockheed Martin
McDonnell Douglas Corporation

Banking

ANZ Banking Group NZ Ltd (NEW ZEALAND)
BBS, Bankenes Betalingsentral A/S (NORWAY)
Banca Commerciale Italiana (ITALY)
Banca Nazionale Del Lavoro (ITALY)
Banca Popolare Etruria E Lanzia (ITALY)
Banco Central Hispano (SPAIN)
Banco Del Caribe SACA (VENEZUELA)
Banco Quilmes (ARGENTINA)
Banco de Boston (ARGENTINA)
Bancomer SA (MEXICO)
Bank of Montreal (CANADA)
Bank of New Zealand (NEW ZEALAND)
Branch Banking & Trust
C.S.O., SpA (ITALY)
Caja de Catalunya (SPAIN)
Carisbo (ITALY)
Cassa di Risparmio di Firenze (ITALY)
Commonwealth Banking Corporation (AUSTRALIA)

Deposit Guaranty National Bank
Hongkong & Shanghai Banking Corp., Ltd (HONG KONG)
ING Facilitair Bedrijf (THE NETHERLANDS)
Istituto Bancario San Paolo Di Torino (ITALY)
Key Services Corporation
Manufacturers & Traders Bank
Michigan National Bank
National Australia Group (SCOTLAND)
National Westminster Bank plc (UNITED KINGDOM)
NationsBank Services
PNC Bank
Plenum Management Consulting GmbH (GERMANY)
Pohlen & Robinson (NEW ZEALAND)
Rochester Community Savings
Royal Bank of Canada (CANADA)
Trust Bank of New Zealand (NEW ZEALAND)

Chemicals/Pharmaceuticals

3M Company
Abbott Laboratories
Bristol-Myers Squibb Company
Ciba-Geigy Corp. NC
Dow Chemical
E.I. Du Pont De Nemours & Co.
Hoechst Marion Roussel, Inc.
Upjohn Company

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 71

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Consumer Goods/Services

3M Company
ADVO Inc.
AT&T American Transtech
American Greetings
American Trans Tech
Avon Products Inc.
Columbia/HCA HealthCare Corporation
Companhia Siderurgica Nacional (BRAZIL)
D&B
E.I. Du Pont De Nemours & Co.
Elsevier Science Ltd (UNITED KINGDOM)
Glaxo Wellcome Inc.
Grattan plc (UNITED KINGDOM)
Hudson's Bay Company (CANADA)
IBM
ICA Handlarnas AB (SWEDEN)
James River Corporation
Joseph E. Seagram & Sons, Inc.
Kaiser Foundation Health Plan
Kimberly Clark Corporation
Kohler Company
McDonald's Corporation
Mead Corporation

Mercantile Stores
Miller Brewing Company
Nabisco Foods, Inc.
Nordstrom Company
ONCE (SPAIN)
Procter & Gamble Company
Reuters (SWITZERLAND)
St. Paul Company
Touristik Union International (GERMANY)
Whitbread & Company plc (UNITED KINGDOM)

Financial Services

Associates Information Services, Inc.
Board of Trade Clearing Corporation
Brown Brothers Harriman & Co.
Charles Schwab Company
Credit Reference Association of Aust (AUSTRALIA)
Dean Witter, Discover & Co.
Federal Home Loan Mortgage
Fidelity Investments
GE Capital Corporation
Halifax Building Society (UNITED KINGDOM)
Household Finance
ICMA Retirement Corporation

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 72

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Merrill Lynch
National Savings (UNITED KINGDOM)
Sallie Mae
State Street Bank & Trust
Sun America
TRW Corporation
Transamerica Occidental Life
Visa International, USA

Government and Education

Administrative Office of the Courts
Alberta Govt Tel/ISM Alberta (CANADA)
CA Health & Welfare Data Center
CSI Piemonte (ITALY)
California State Franchise Tax Board
City of Long Beach
City of Seattle
Commonwealth of Pennsylvania
Commonwealth of Virginia
Controllers Office
Dept of Health & Welfare
Gerencia De Informatica (SPAIN)
Government of Newfoundland & Labrador (CANADA)
Human Resources Development (CANADA)
Infocamere (ITALY)

Lincolnshire County Council (UNITED KINGDOM)
Ontario Management Board Secretariat (CANADA)
Orange County of Florida
Palm Beach County
SVB (THE NETHERLANDS)
Serpro (BRAZIL)
St. of FL Dept. of Labor & Employment
State of Alabama
State of Georgia
State of North Carolina
State of Tennessee
State of Utah
Statens Datasentral A/S (NORWAY)
Stephen P. Teale Data Center
Technology Planning & Management Corp.
US Department of State
US Patent & Trademark Office
US Postal Service
Westinghouse Savannah River Company

Insurance

AGF Fenix Sistemias (SPAIN)
Allstate Insurance
Automobile Association (UNITED KINGDOM)
Blue Cross & Blue Shield of Minnesota

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 73

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Blue Cross/Blue Shield of Maryland
Blue Cross/Blue Shield Mutual of Ohio
Blue Cross/Blue Shield of North Carolina
CIGNA Corporation
Equitable Financial Companies
General American Life Insurance
Group Health Incorporated
Health Care Services Corporation
ITT Hartford Insurance Group
John Hancock
Mutual of Omaha
Nationwide Insurance
Prudential
Shared Services Center
US Fidelity & Guaranty Co.
USAA Information

Manufacturing and Electronics

Acesita (BRAZIL)
American Honda Motor Co., Inc.
Beckman Instruments
British Steel plc (UNITED KINGDOM)
Caterpillar
Companhia Vale do Rio Doce (BRAZIL)
Leviton Manufacturing
NSI SRL (ITALY)
Nissan North America

POSDATA Company Ltd. (KOREA)
Philips Electronics
Pirelli Informatica S.P.A. (ITALY)
Sony Corporation of America
Sun Alliance & Royal Insurance (AUSTRALIA)
USX Corporation
Volkswagen of America, Inc.

Outsourcers

Andersen Consulting Chicago
Datacor/ISM Atlantic Corporation (CANADA)
Finsiel Spa (ITALY)
ISM Corporation (CANADA)
ISM SK (CANADA)
National Computer Systems (SINGAPORE)
NewTel Information Solutions Ltd. (CANADA)
Origin B.V. (THE NETHERLANDS)
Telenor Teamco A/S (NORWAY)

Petroleum and Gas

Amerada Hess
Amoco Corporation
Arco Exploration & Production Tech
Chevron Information Technology Company
Shell Services Co.

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 74

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Telecommunications

AT&T Universal Card Services Corp.
AirTouch Cellular
Alberta Govt Tel/ISM Alberta (CANADA)
Alcatel Bell Telephone (BELGIUM)
Alcatel CIT (FRANCE)
Alcatel SEL AG (GERMANY)
Alcatel SESA (SPAIN)
Bell Atlantic NYNEX Mobile, Inc.
Bell Sygma (CANADA)
BellSouth Information Systems
Ericsson Radio Systems
Ericsson Telecomunicazioni SpA (ITALY)
GTE - US
GTE Telephone Operations HQ
MCI Communications Corporation
NYNEX
SaskTel (CANADA)
TPI (SPAIN)
Telecom A/S (DENMARK)
Telecom Australia (AUSTRALIA)
Telus (CANADA)
Telus/Edmonton Telephone (CANADA)

Transportation

CSX Technology
Caliber Technology, Inc.
Canadian National Railways (CANADA)
Ente Ferrovie Dello Stato (ITALY)
Galileo International
RATP (FRANCE)
Tranzrail New Zealand Limited (NEW ZEALAND)

Utilities

AGL Gas Company Ltd. (AUSTRALIA)
American Electric Power
Boston Edison
British Gas Transco (UNITED KINGDOM)
CESP-Cia Energetica do Estado de S.P. (BRAZIL)
CIA Sevillana de Electricidad (SPAIN)
CPFL (BRAZIL)
Canadian Utilities Ltd. (CANADA)
Carolina Power & Light
Central & South West Services
China Light & Power Co., Ltd. (HONG KONG)
Columbia Gas System Services
Commonwealth Edison
Companhia De Telefones Do Brasil (BRAZIL)

Virginia Tech

JLARC DRAFT—NOT APPROVED

Page 75

REAL DECISIONS
A GARTNER GROUP COMPANY

Partial List of Real Decisions Mainframe Data Center Clients

Duke Power
ENEL SpA (ITALY)
Edinfor - Sistemas Informaticos, s.a. (PORTUGAL)
Edison International
Energie-Versorgung Schwaben AS (GERMANY)
Entergy Systems
F.E.C.S.A. (SPAIN)
Florida Power Corporation
Hydro-Quebec (CANADA)
Illinois Power
Integral Energy (AUSTRALIA)
Kentucky Utilities Company
LA Dept. of Water & Power
North West Water Ltd. (UNITED KINGDOM)
Northeast Utilities
Northern Ireland Electricity plc (UNITED KINGDOM)
Ontario Hydro (CANADA)
Seaboard plc (UNITED KINGDOM)
Southern Company Services
Texas Utilities
Utilicorp
Virginia Power

Virginia Tech

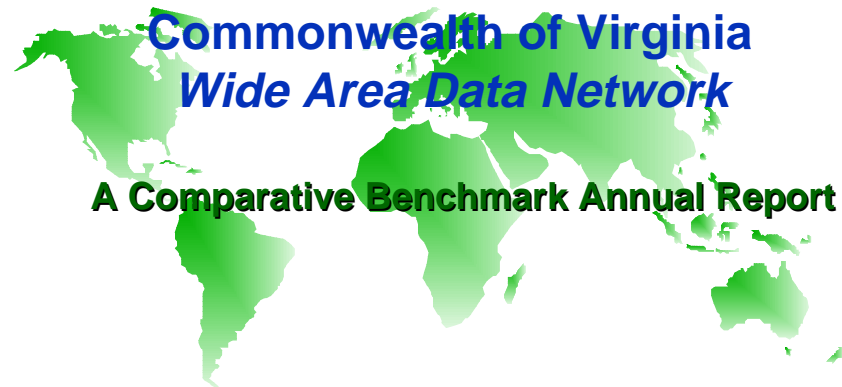
JLARC DRAFT—NOT APPROVED

Page 76

REAL DECISIONS
A GARTNER GROUP COMPANY

Data Network



A green silhouette of a world map with the continents of North America, South America, Europe, Africa, Asia, and Australia visible.

Commonwealth of Virginia Wide Area Data Network A Comparative Benchmark Annual Report

REALDECISIONS
A GARTNER GROUP COMPANY

Analysis Period: 1996

Discussion Outline

- ❖ Introduction and Background
- ❖ Benchmarking Methodology Review
- ❖ Database Trends
- ❖ Overview and Results
 - Wide Area Data Networks
 - ◆ SNA
 - ◆ MPN
- ❖ Observations and Conclusions
- ❖ Recommendations and Strategies for Improved Performance

REALDECISIONS
A GARTNER GROUP COMPANY

2

Analysis Period: 1996

Introduction

- ❖ Management Presentation participants
 - Real Decisions—John H. Chang
 - DIT Network Team and JLARC Management
- ❖ Real Decisions a Gartner Group company
 - Is the premier worldwide provider of IT strategic audit services
 - Has the most comprehensive current client database representing more than 400 organizations
 - Has experience based on over 20 years of conducting more than 5,000 strategic audits
- ❖ A partial listing of Real Decisions' Data and Voice Network Benchmark Members follows

REALDECISIONS
A GARTNER GROUP COMPANY

3

Analysis Period: 1996

Partial List of Real Decisions' Data and Voice Network Benchmark Members

AgCo Services	Canada Post/SHL Systemhouse (Canada)	Entergy
Airbus Industries (UK)	Canada Trust (Canada)	Ernst & Young
Alberta Public Works (Canada)	Canadian Imperial Bank (Canada)	FECSA (Spain)
Alcatel France (France)	Canadian Tire (Canada)	First Chicago
Alcatel SESA (Spain)	Carolina Power & Light	Florida Power & Light
AMEX Life	Case Industries	Ford
Amoco	COMMVApillar	GE Capital
ARCO	Celsius Information System (Sweden)	General Public Utilities Service Corporation
Arizona Public Service Company	Charles Schwab	GENIX
Asea Brown Boveri (ABB)	Chemical Bank	Georgia Pacific
AT&T Bell Laboratories	Chevron	Halliburton
AT&T GIS	Ciba-Geigy	Harris Trust & Savings Bank
Banco Bradesco (Brazil)	CIGNA	Health Care Services
Banco del Caribe (Venezuela)	City of Cincinnati	Hewlett Associates
Bank of Montreal	City of Los Angeles (Water & Power)	HMSO (UK)
Barnett Technologies	Columbia Gas System Services	Home Savings
B.C. Systems (Canada)	Conrail	Household International
BC/BS of Florida	Coors	Howmet Corporation
BC/BS of Georgia	CYLIX	Hudson's Bay Company (Canada)
Beckman Instruments	Delta Air Lines	Hughes Aircraft
Bell Canada (Canada)	Dow Chemical	Humana
Bell Communications Research	Dun & Bradstreet	IBM
Bell Sygma (Canada)	Eagle Star (UK)	IBM Canada
BellSouth Information Systems	Eastman Kodak	IDS Financial Services
Boston Edison	Eli Lilly	Illinoms Power
British Aerospace (UK)	ENDESA (Spain)	Imperial Oil Canada (Canada)

REALDECISIONS
A GARTNER GROUP COMPANY

4

Analysis Period: 1996

Partial List of Real Decisions' Data and Voice Network Benchmark Members

Insurance Corporation of British Columbia (ICBC) (Canada)	Pacific Gas & Electric	State of California (Health & Welfare)
Kaiser Permanente	Palm Beach County	State of Kansas
Key Services	PECO Energy	State of Montana
Laurentian Technology (Canada)	Philip Morris Europe (Switzerland)	State of New Jersey Department of Treasury
Lockheed Missiles & Space	Philips International (Netherlands)	State of North Carolina
Louisville Gas & Electric	Pitney Bowes (UK)	State of Ohio
Marion Merrell Dow	PNC Bank	State of Utah
Marriott Corporation	Port Authority of New York	StatOil (Norway)
Martin Marietta IS	Procter & Gamble	Telecom Australia (Australia)
McDonnell Douglas	Prudential Services	Telenor Teamco (Norway)
McGraw-Hill	Ralston Purina	Tennessee Valley Authority (TVA)
MCN Computer Services	Royal Bank of Canada (Canada)	Texaco
Merrill Lynch	S.C. Johnson	Texas Commerce Bank
Metropolitan Life	Sacramento Municipal Utility District	Texas Instruments
Mobil	Salt River Project	Texas Utilities Services
Moore Business Forms	Sandia National Laboratories	Trust Bank New Zealand (New Zealand)
Nabisco Foods Group	Schering-Plough	TRW
National Semiconductor	Shell Canada (Canada)	U S WEST
National Westminster Bancorp	Shell Oil	United Technologies
National Westminster Bank (UK)	Shell (UK)	UNOCAL
NationsBank	SIA SPA	USAA
Nationwide Insurance	SmithKline Beecham	USF&G
Northeast Utilities	Sony	Virginia Power
Northern Telecom	South Carolina Electric & Gas	Visa
Northrop Grumman	Southern California Edison	Wachovia Operational Services
Norwest Technical Services	State of California (Department of Water Resources)	Whitbread
		Xerox

Purpose of This Report

- ❖ Communicate the finalized results of the comparative benchmark analysis
- ❖ Ensure that all interested parties have a clear understanding of COMMVA's position relative to the selected peer group, and the Real Decisions database averages
- ❖ Identify specific areas and opportunities for improvement with appropriate action recommendations

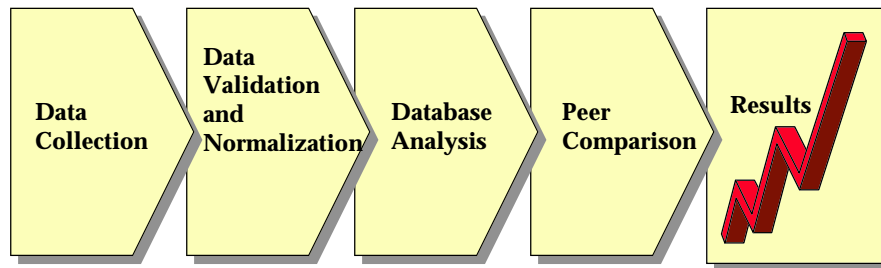
Background

- ❖ The goal of the study is to benchmark the cost effectiveness of the COMMVA data network, and as a result:
 - Identify areas of opportunity for cost reduction or productivity improvement
 - Determine the cost structure relative to peer organizations
 - Document the effectiveness of the network organization as a supplier of network services to its client organizations

Background

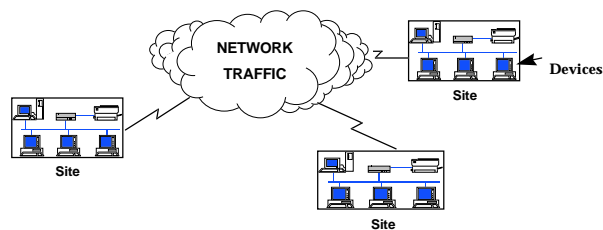
- ❖ Our analysis continues to use our traditional quantitative analysis coupled with a structured qualitative analysis.
 - Utilizing a structured analysis methodology to examine in detail four specific IT management disciplines. This effort uses a Technology, Organization and Process (TOP) model approach to examine the components of each discipline.
 - NO Disciplines were selected for this study.

Benchmarking Methodology



Benchmarking Methodology

- ❖ **NOW Index**—a single metric that is used to compare the productivity of networks
 - It is an independent measure of unit cost efficiency
 - It consists of three independent “WORKLOAD” drivers
 - ◆ Network Traffic, Sites, and Devices



Benchmarking Methodology

❖ Data Network NOW Index Calculation

$$\frac{\text{Normalized cost}}{\text{Work produced}} = \frac{\begin{array}{l} \$ \text{ Hardware/Software} \\ \$ \text{ Personnel} \\ \$ \text{ Transport} \\ \$ \text{ Traffic} \\ \$ \text{ Sites} \\ \$ \text{ Devices} \end{array}}{\text{NOW Index}}$$

The NOW Index is a unit cost comparison of network efficiency

Benchmarking Methodology

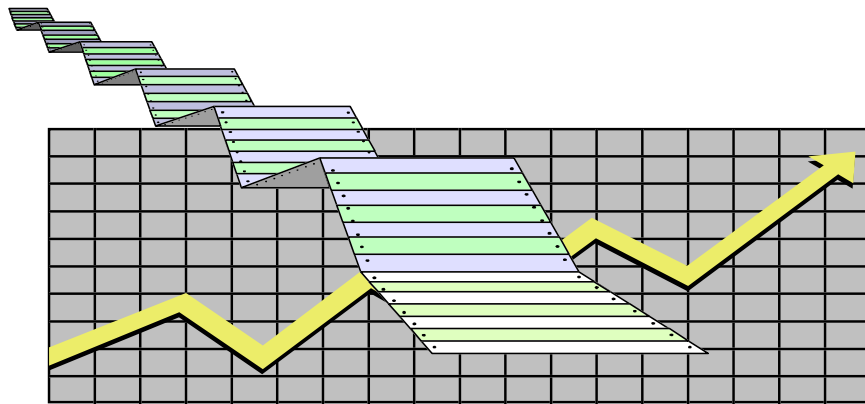
- ❖ A key step in the benchmarking process is peer selection in order to properly compare COMMVA to other organizations with a similar profile.
 - “Peer” organizations from the public and private sector were selected from the real decisions data base.
 - Why was COMMVA compared to these peers?
 - ♦ The percentage mix of “workload” was approximately the same; and/or
 - ♦ They possessed a similar geographic orientation; and/or
 - ♦ They possessed a similar data network architecture; and/or
 - ♦ They possessed a similar operation (i.g., 7x24 Help Desk)
- ❖ Independent Peer Groups were selected for each network view.

Peer Selection Criteria

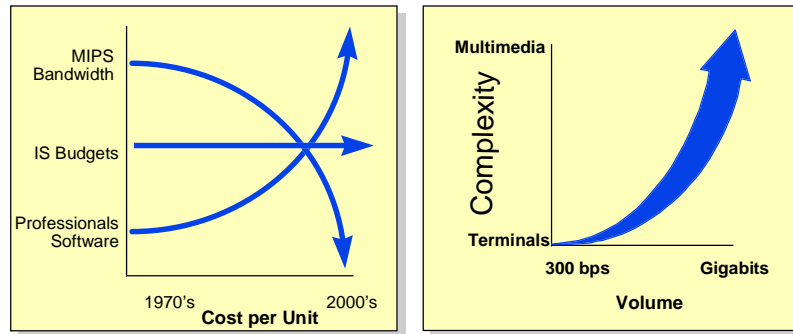
Client	Industry	Type	Size	Workload	Budget	Staff	Density	Geography
I7	ST GOV	HIER	X	X	X	X	X	X
7D	ST GOV	HIER	X	X			X	X
OD	ST GOV	HIER	X	X	X		X	X
GX	ST GOV	HIER	X		X	X	X	X
6U	RET	HIER	X	X		X	X	X
IR	OIL	MPN	X	X	X	X	X	X
XD	UTIL	MPN	X		X	X	X	X
RD	UTIL	MPN		X	X	X	X	X
6Z	CSMR	MPN	X		X	X	X	X
KH	AUTO	MPN		X	X	X	X	X
A8	ST GOV	MPN	X	X	X	X	X	X

These are the best fits for the peer selections based on the above criteria.

Wide Area Data Network Database Trends



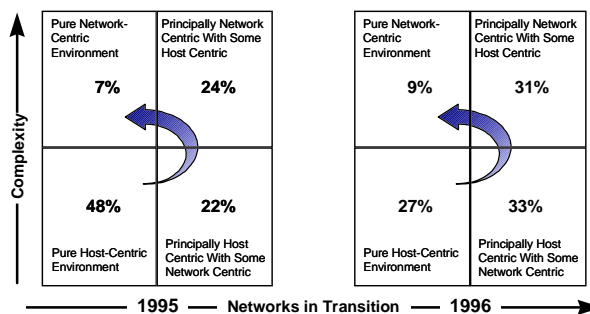
Telecommunications Industry Dynamics



Measures of network unit cost components have been changing over time while new demands being placed on client networks are growing rapidly.

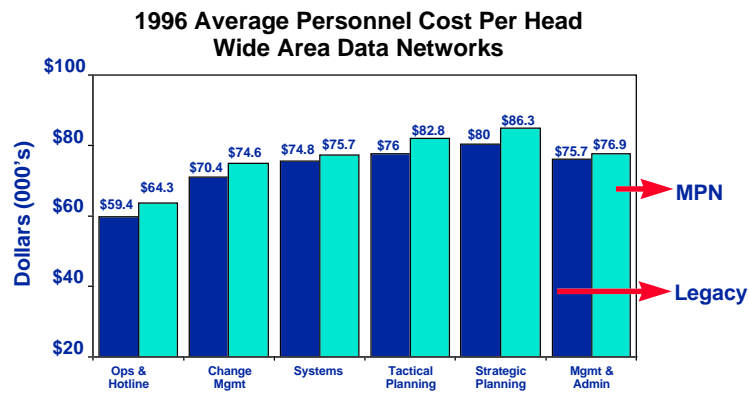
Database Trends

Real Decisions Database Transition by Network Type



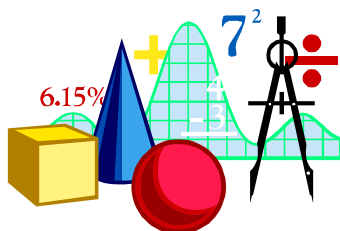
Although many host centric environments are still in place, accelerated investment in multiprotocol environments is changing the mix of networks in our database. COMMVA is principally host centric with some network centric.

Database Trends



Multiprotocol Network full time equivalent staff (FTE's) are consistently than legacy network FTE's.

Overview of COMMVA Network Services



Our Understanding COMMVA—Role

- ❖ Provide leadership in the efficient utilization and control of information technology resources in state government, with the objective of maximizing the return on the Commonwealth's investment in these resources.
- ❖ Provide cost effective information technology services.
- ❖ Ensure proper control over the expenditure of funds and a continuing source of revenue sufficient to finance its customer services

Our Understanding COMMVA—DIT's Mission Statement

- ❖ To centralize planning, budgeting, acquisition, development, operation and management of the Commonwealth's data processing and telecommunications services.

*Our Understanding:
Challenges Facing COMMVA Networking*

- ❖ **Hierarchical Network**
 - Change Technology
 - Shrink Customer Base
 - Reduce Expenditures
- ❖ **MPN**
 - Maintain Operational Performance
 - Contain Cost
 - Update technology

Overview

- ❖ This quantitative analysis establishes a baseline for future comparative analysis of COMMVA's efforts to improve the unit cost efficiency in their Wide Area Data Networks.

Our Understanding

- ❖ Cost and workload information has been provided by six agencies and coordinated by DIT.
- ❖ The studied network consist primarily of 9.6 KB and 56 KB circuits, supplemented by T1.
- ❖ The network is viewed as providing a utilitarian service to all agencies.
- ❖ This analysis reflects cost and workload data for only a *subset* of COMMVA's network environment.
- ❖ Information from various agencies has been aggregated and comparisons have been done for the hierarchical and multiprotocol networks against selected peer groups.

Study Parameters

- ❖ The study reflects 1996 data
- ❖ The hierarchical network under study consists of networks of the following agencies: DIT, DMA, DSS, Court.
- ❖ The multiprotocol network under study consists of networks of these four agencies: DIT, DMV, DOT and DMA.
- ❖ The scope of the study included:
 - Only COMMVA's Hierarchical and Multiprotocol networks
- ❖ The scope of the study excluded:
 - LAN Infrastructure and desktop support
 - Voice services
 - Other agency-specific networks

Wide Area Data Network Results

COMMVA Results—Hierarchical

- ❖ The NOW Index for COMMVA's Hierarchical network is 0.54. This is approximately 4.4% higher than the selected peer group (0.51).
- ❖ On a cost basis, COMMVA outperforms the peer group significantly (54% lower) in the transmission area, but this is partially offset by more expenditure (34%) in hardware.
- ❖ The Software costs are comparable between COMMVA and the peer group, but COMMVA's Personnel costs are very high compared the peer group (158% higher in headcount and 10% higher in cost per person).
- ❖ Four of the five peer group members are state governments, and the remaining one is a technology company. All of them conduct their business within a state and are transitioning from hierarchical environment to an MPN infrastructure

COMMVA Results—Hierarchical

NOWIndex Calculation

COMMVA-HIER

Workload Driver	Annual Workload	Database Standard Unit Value	Workload Value
Traffic (GBs)	2,586	\$265.30	\$685,986
Sites	943	\$6,764.43	\$6,378,861
Devices	34,563	\$100.50	\$3,473,499
			\$10,538,345

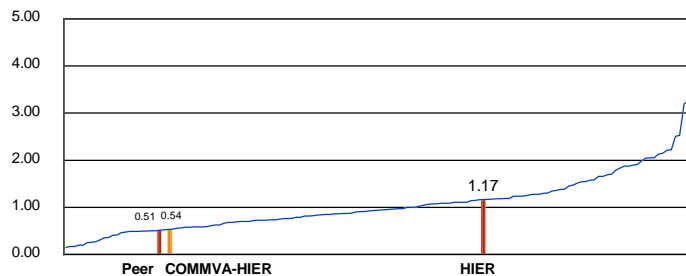
COMMVA-HIER	\$5,658,339
Workload Value	\$10,538,345
NOWIndex	0.54

COMMVA's NOW Index of 0.54 reflects the ratio between the actual consensus cost to operate the network (\$5.685 MM) and what the average of the entire database population would spend (\$10.538 MM), to complete COMMVA's workload.

COMMVA Results—Hierarchical

NOWIndex Comparison

COMMVA-HIER

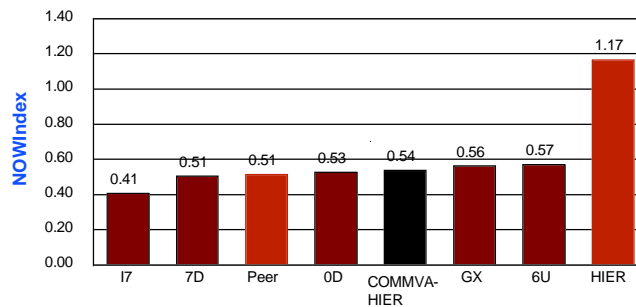


Active Database Population

For both COMMVA and the selected peer group, their workload value vs. actual costs positions them below the database average. Database averages are shown here as reference points only; the key comparison is COMMVA to the selected peer group.

COMMVA Results—Hierarchical

NOWIndex Comparison COMMVA-HIER



Wide Area Data Networks

The selected peer group for COMMVA have indices ranging from 0.41 to 0.57 and have a composite index of 0.51. COMMVA and the peer share similar network profiles.

COMMVA Results—Hierarchical

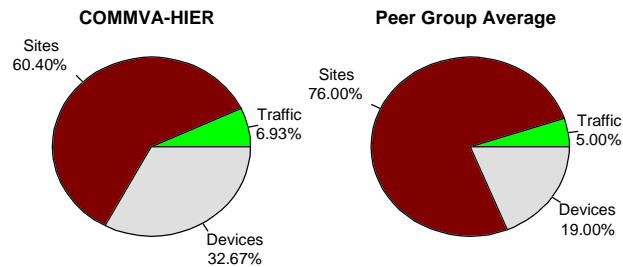
Peer Work Value Comparison COMMVA-HIER

Workload Driver	Annual COMMVA-HIER Workload	Peer Standard Unit Value	Peer Value
Traffic (GBs)	2,586	\$136.41	\$352,704
Sites	943	\$3,477.97	\$3,279,730
Devices	34,563	\$51.67	\$1,785,920
			\$5,418,354
	COMMVA-HIER	Peer	Difference
Cost to Produce	\$5,658,339	\$5,418,354	4.43%

The peer work value contrasts actual COMMVA expenditures with the selected peer group doing COMMVA's work. This creates a peer cost profile that can then be broken down into components and examined for similarities and differences.

COMMVA Results—Hierarchical

Distribution of Workload Value



COMMVA and the peer group have similar workload profiles in that both vary from the database average with sites taking a larger role. However, COMMVA differs from the Peer with a higher device workload value.

COMMVA Results—Hierarchical

Cost Comparison (000s)

COMMVA-HIER

Cost Category	COMMVA-HIER	Peer Group	Difference
Hardware	\$1,364	\$1,021	\$343
Software	\$567	\$624	-\$57
Personnel	\$2,430	\$941	\$1,489
Transmission	\$1,297	\$2,833	-\$1,535
	\$5,658	\$5,418	\$240

Both on a percent distribution and in actual dollars, COMMVA expenses are lower than the peer group in transmission, but significantly higher in personnel.

COMMVA Results—Hierarchical

Hardware Comparison (000s)

COMMVA-HIER

Hardware Category	COMMVA-HIER	Peer Group	Difference
Host Control	\$346	\$542	-\$196
Multiplexing	\$318	\$32	\$286
X.25	\$0	\$319	-\$319
Routers/Bridges	\$0	\$0	\$0
Gateways	\$4	\$5	-\$1
Network Mgmt	\$49	\$32	\$17
Modems	\$647	\$90	\$557
Other	\$0	\$0	\$0
Total	\$1,364	\$1,021	\$343

COMMVA has higher expenditure in multiplexing and modems, and the overall costs in hardware is 34% above the selected peer group average. However, this investment helps to create low overall transmission cost.

COMMVA Results—Hierarchical

Transmission Comparison (000s)

COMMVA-HIER

Transmission Category	COMMVA-HIER	Peer Group	Difference
Dedicated	\$1,297	\$2,753	-\$1,455
Dial	\$0	\$67	-\$67
VAN	\$0	\$13	-\$13
Total	\$1,297	\$2,833	-\$1,535

As a result of consolidation among several networks, COMMVA's overall transmission cost is much lower than the peer group, especially in the backbone area.

COMMVA Results—Hierarchical

Headcount Comparison

COMMVA-HIER

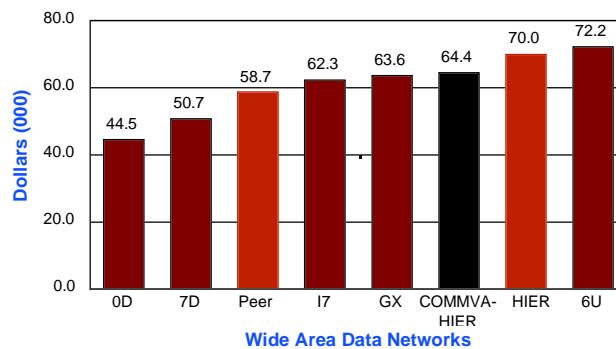
Personnel Category	COMMVA-HIER	Peer Group	Difference
Mgmt. & Admin.	9.93	2.58	7.35
Planning	6.52	1.53	4.99
Systems	3.51	1.33	2.18
Change Mgmt.	5.15	2.65	2.50
Ops. & Hotline	12.60	7.96	4.64
Total	37.71	16.05	21.66
Annual Cost	\$2,430,000	\$941,379	\$1,488,621
Cost/Person	\$64,439	\$58,661	\$5,778

The overall headcount is very different between COMMVA and the selected peer group. COMMVA's annual cost is much higher because of 158% higher in headcount and 10% higher in cost per person. COMMVA has a much higher percentage in management and planning.

COMMVA Results—Hierarchical

Annual Cost Per Person

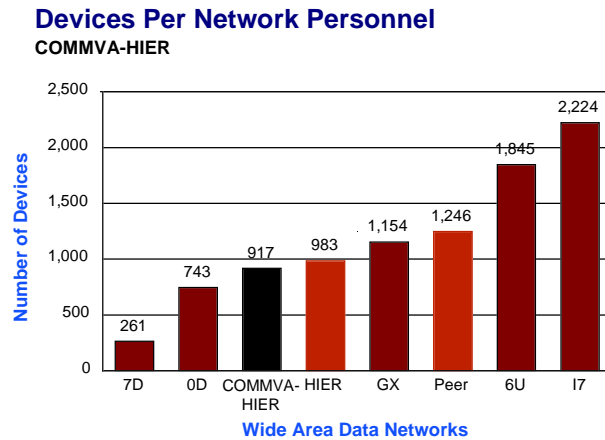
COMMVA-HIER



Wide Area Data Networks

The average fully loaded cost per person for COMMVA in the hierarchical environment is 10% higher than the peer group. The higher headcount in management and planning, containing higher compensated, more experienced personnel skew COMMVA's overall average cost per person.

COMMVA Results—Hierarchical



One measure of staff productivity is "Devices per Network Personnel". In the hierarchical environment, COMMVA is lower than both the peer group and database averages.

REALDECISIONS
A GARTNER GROUP COMPANY

37

Analysis Period: 1996

COMMVA Results—MPN

- ❖ The NOW Index for COMMVA's MPN is 1.11. This is very similar to the peer group (1.10).
- ❖ On a cost basis, COMMVA outperforms the peer group in both personnel and transmission areas.
- ❖ All of the six companies selected for COMMVA's MPN Peer comparative group operate statewide Data Networks. Most of them are in the technology and utility industries. One member of the peer group is a state government.

REALDECISIONS
A GARTNER GROUP COMPANY

38

Analysis Period: 1996

COMMVA Results—MPN

NOWIndex Calculation

COMMVA-MPN

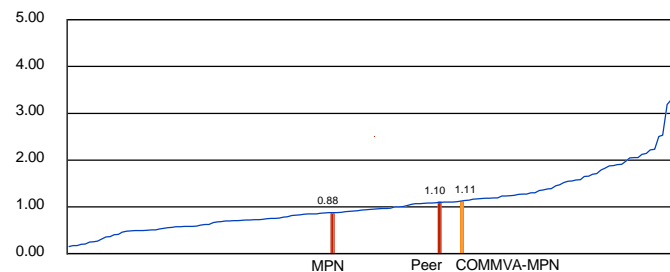
Workload Driver	Annual Workload	Database Standard Unit Value	Workload Value
Traffic (GBs)	3,362	\$265.30	\$892,056
Sites	192	\$6,764.43	\$1,298,771
Devices	15,712	\$100.50	\$1,579,018
			\$3,769,846
COMMVA-MPN Cost			\$4,186,892
Workload Value			\$3,769,846
NOWIndex			1.11

COMMVA's NOW Index of 1.11 reflects the ratio between the actual consensus cost to operate the network (\$4.186 M) and what the average of the entire database population would spend (\$3.769 M) to complete COMMVA's workload.

COMMVA Results—MPN

NowIndex Comparison

COMMVA-MPN



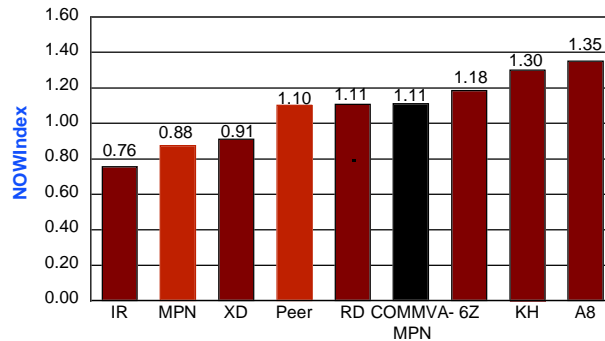
Active Database Population

For both COMMVA and the selected peer group, their workload value vs. actual costs position them above the database average. Database averages are shown as reference points only; the key comparison is COMMVA to their peer group.

COMMVA Results—MPN

NOWIndex Comparison

COMMVA-MPN



Wide Area Data Networks

The selected peer group for COMMVA have indices ranging from 0.76 to 1.35 and have a composite index of 1.10. COMMVA and their peer group share very similar network characteristics.

COMMVA Results—MPN

Peer Work Value Comparison

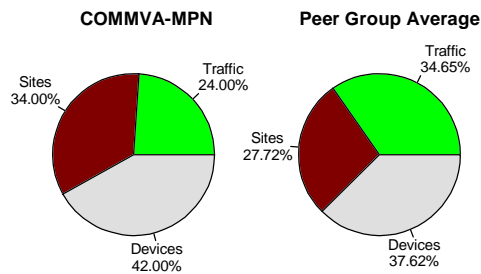
COMMVA-MPN

Workload Driver	Annual COMMVA-MPN Workload	Peer Standard Unit Value	Peer Value
Traffic (GBs)	3,362	\$292.34	\$982,985
Sites	192	\$7,453.94	\$1,431,157
Devices	15,712	\$110.74	\$1,739,970
			\$4,154,111
	COMMVA-MPN	Peer	Difference
Cost to Produce	\$4,186,892	\$4,154,111	0.79%

The peer work value contrasts actual COMMVA expenditures with the selected peer group doing COMMVA's work. This creates a peer cost profile that can then be broken down into components and examined for similarities and differences.

COMMVA Results—MPN

Distribution of Workload Value

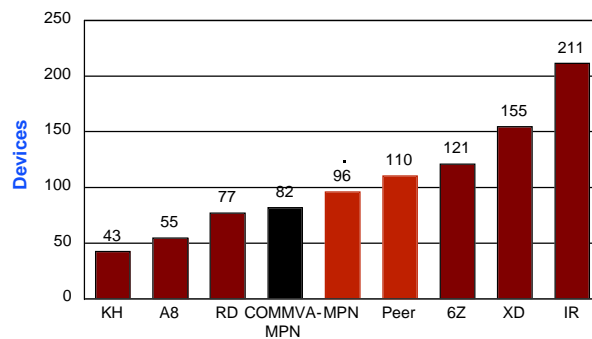


COMMVA and the peer group have very similar workload profiles with device being the dominant value followed by sites. This profile is somewhat different from the database average, which is more traffic intensive.

COMMVA Results—MPN

Devices Per Site

COMMVA-MPN



Wide Area Data Networks

COMMVA's ratio of devices per site is below both the Peer and database average. COMMVA is still early in their migration stage.

COMMVA Results—MPN

Cost Comparison (000s) COMMVA-MPN

Cost Category	COMMVA-MPN	Peer Group	Difference
Hardware	\$780	\$693	\$86
Software	\$367	\$125	\$243
Personnel	\$1,430	\$1,569	-\$138
Transmission	\$1,610	\$1,767	-\$158
	\$4,187	\$4,154	\$33

Both on a percent distribution basis and on an actual dollar basis, COMMVA is very similar to the peer group in hardware, personnel and transmission areas. COMMVA is only 1% higher than the peer group in the overall expenditures.

COMMVA Results—MPN

Hardware Comparison (000s) COMMVA-MPN

Hardware Category	COMMVA-MPN	Peer Group	Difference
Host Control	\$4	\$24	-\$19
Multiplexing	\$0	\$37	-\$37
X.25	\$247	\$49	\$198
Routers/Bridges	\$253	\$465	-\$212
Gateways	\$0	\$64	-\$64
Network Mgmt	\$10	\$21	-\$11
Modems	\$266	\$34	\$231
Other	\$0	\$0	\$0
Total	\$780	\$693	\$86

With low expenses in most areas except for CSU/DSUs (in the Modems category), COMMVA has a 12% higher hardware cost than the peer group.

COMMVA Results—MPN

Transmission Comparison (000s)

COMMVA-MPN

Transmission Category	COMMVA-MPN	Peer Group	Difference
Dedicated	\$1,610	\$1,615	-\$5
Dial	\$0	\$104	-\$104
VAN	\$0	\$49	-\$49
Total	\$1,610	\$1,767	-\$158

The majority of COMMVA's MPN network is Frame Relay. Some Frame Relay Permanent Virtual Circuits are used to backup mission critical traffic. The overall transmission costs are comparable between COMMVA and the peer group.

COMMVA Results—MPN

Headcount Comparison

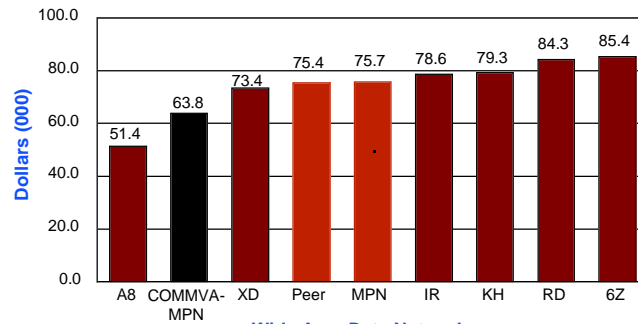
COMMVA-MPN

Personnel Category	COMMVA-MPN	Peer Group	Difference
Mgmt. & Admin.	6.72	3.09	3.63
Planning	3.35	3.72	-0.37
Systems	1.21	2.01	-0.80
Change Mgmt.	6.07	3.80	2.27
Ops. & Hotline	5.06	8.19	-3.13
Total	22.41	20.81	1.60
Annual Cost	\$1,430,250	\$1,568,696	-\$138,446
Cost/Person	\$63,822	\$75,390	-\$11,569

COMMVA's annual personnel cost is 8% lower than the peer group because of 7% more in headcount and 15% lower in cost per person. In terms of headcount distribution COMMVA is high in Management, Administration and Change Management.

COMMVA Results—MPN

Annual Cost Per Person COMMVA-MPN



Wide Area Data Networks

The average fully loaded cost per person for COMMVA is lower than both the database average and the peer group. The costs per person are similar in both types of networks under study. However, the cost per person in our database is higher in the multiprotocol network compared to that in the hierarchical network.

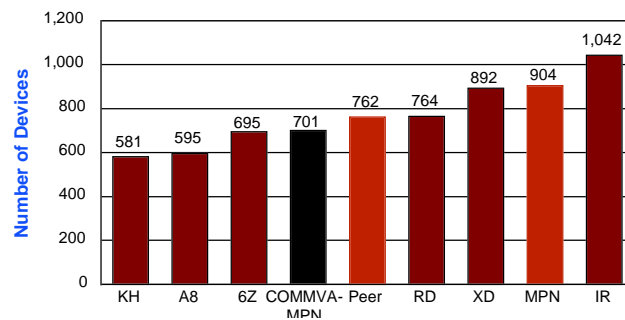
REALDECISIONS
A GARTNER GROUP COMPANY

49

Analysis Period: 1996

COMMVA Results—MPN

Devices Per Network Personnel COMMVA-MPN



Wide Area Data Networks

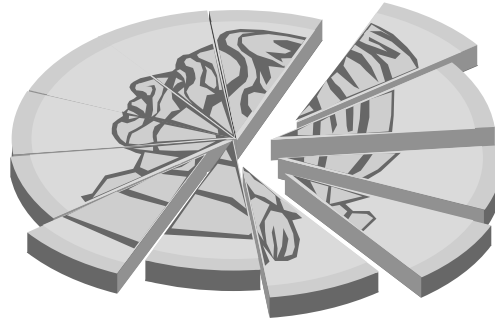
One measure of staff productivity is "Devices per network Personnel". Similar to the hierarchical network, COMMVA is below both the database and the peer group averages in the MPN environment. Most clients would like to move to the right, but not necessarily the hard right.

REALDECISIONS
A GARTNER GROUP COMPANY

50

Analysis Period: 1996

Observations and Conclusions



Observations and Conclusions—GENERAL

- ❖ Cost and Workload information has been provided by only six out of many agencies from the Commonwealth of Virginia. It is unknown what percentages of the total cost and workload are covered here.
- ❖ Since only *partial* data were available, the overall study does not represent the actual cost efficiency from the viewpoint of the whole state, but can only be attributed to the participating agencies.
- ❖ During the study process it became apparent that several of the agencies included do not have the capability to provide information consistent with the Real Decisions consensus cost model. This, combined with no centralized information other than shared transmission allocation, inhibits our ability to effectively analyze the underlying cost components.
- ❖ The COMMVA hierarchical network performs significantly better on a unit cost basis than the multiprotocol network. This is atypical of most client networks in the Real Decisions database.

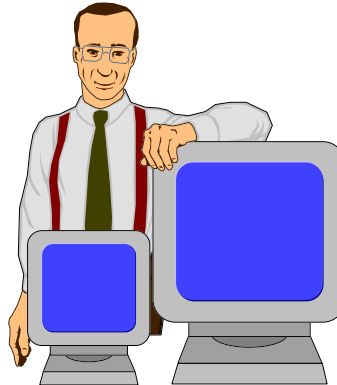
COMMVA Results—Hierarchical

- ❖ The NOW Index for COMMVA's Hierarchical network is 0.54. This is approximately 4.4% higher than the selected peer group (0.51).
- ❖ On a cost basis, COMMVA outperforms the peer group significantly (54%) in the transmission area, but this is partially offset by more expenditure (34%) in hardware.
- ❖ The Software costs are comparable between COMMVA and the peer group, but COMMVA's Personnel costs are very high compared the peer group (158% higher).
- ❖ Four of the five peer group members are state governments, and the remaining one is a technology company. All of them conduct their business within a state and are transitioning from hierarchical environment to an MPN infrastructure

COMMVA Results—MPN

- ❖ The NOW Index for COMMVA's MPN is 1.11. This is very similar to the peer group (1.10).
- ❖ On a cost basis, COMMVA outperforms the peer group in both personnel and transmission areas.
- ❖ All of the six companies selected for COMMVA's MPN Peer comparative group operate state-wide Data Networks. Most of them are in the technology and utility industries. One member of the peer group is a state government.

Strategies for Improved Performance (SIPs)



Strategies for Improved Performance

GENERAL:

The following strategies for improved performance target the areas that we believe are critical to COMMVA's continued improvement in the cost efficiency and performance of the data network services that it delivers to all state agencies. Actions in these areas are also key to the stated network transition plan that will move the existing hierarchical workload onto the MPN. The areas that we see as key to the success of migration of hierarchical network to MPN infrastructure are migration strategy development, network design, network management and staffing.

Strategies for Improved Performance

MIGRATION STRATEGY DEVELOPMENT

Issue: COMMVA has been installing and migrating to an MPN infrastructure. At the present time COMMVA's hierarchical network performs much better than the multiprotocol counterpart on a unit cost basis. Although some of the agencies are planning to migrate their hierarchical networks to the multiprotocol environment, there are no formal strategies in place and no coordinated effort has been planned to address these important issues.

Strategy: Develop a comprehensive migration strategy covering all state agencies.

- ❖ As new applications are developed, they should be designed for the MPN where feasible. The impact of future MPN expansion should be assessed and monitored with prudence.
- ❖ Consolidate systems service requirements to provide consistent service levels and Define services to be offered.
- ❖ Develop resource management plans to provide adequate systems and staffing to support developing applications.

Strategies for Improved Performance

MIGRATION STRATEGY DEVELOPMENT (Cont'd)

First Steps:

- ❖ A centralized network organization such as DIT should be given the responsibility for overall planning, design and resource control.
- ❖ Systems for measuring and monitoring network activity should be implemented in all agencies.
- ❖ The distribution of transmission costs between the hierarchical and multiprotocol networks needs to be reviewed to understand the costs and how to impact them.
- ❖ Cross agency sharing of skills, equipment and knowledge should be pursued.

Goal:

- ❖ To insure a successful migration from hierarchical networks onto an MPN environment with high cost efficiency and good performance.

Strategies for Improved Performance

NETWORK DESIGN

Issue: At present, there are 1,135 sites in COMMVA's network, 943 of them are hierarchical, 192 of them are peer-to-peer, and over 20% of them are counted in both environments.

Strategy: Design data network to consolidate all hierarchical and multiprotocol circuits and equipment acquisitions based on total service requirements.

Goal: To design an optimal network for the MPN environment using advance technologies and best available carrier offerings.

Strategies for Improved Performance

NETWORK MANAGEMENT

Issue: COMMVA's current expenditure in network management is high in the hierarchical environment, but low in the MPN environment. This is inconsistent with the planned goal of network migration.

Strategy: Evaluate COMMVA's present and future requirements for network management in the multiprotocol environment, consistent with the business dependency on the network.

Goal: To insure adequate network management in the expanding MPN environment, including all major functions such security, performance, accounting, and capacity planning.

Strategies for Improved Performance

STAFFING

Issue: COMMVA's headcount is comparable to and slightly higher than the peer group in the multiprotocol environment, but much higher (158%) in the hierarchical environment. Furthermore, COMMVA has a higher distribution in management, planning and change management, but lower in operations and help desk than the peer group average.

Strategy: Assess the hierarchical staff ability to transition to the MPN. Be prepared to allocate and consolidate Change Management staff in both environments to facilitate the planned transition. Provide adequate coverage in operations and help desk while the MPN is expanding.

First Step: Plan MPN training programs for hierarchical personnel.

Goal: To assure proper distributions and skill levels in all personnel functions.

One Last Word



Voice Network



Commonwealth of Virginia Voice Information Processing Analysis

Agenda . . .

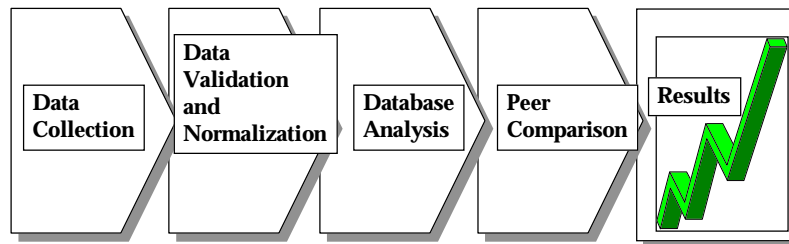
- ◆ Real Decisions Introduction
- ◆ Process Review
- ◆ Study Overview
- ◆ Study Results
 - Voice Network
 - Voice Technologies
- ◆ Strategies for Improved Performance

Commonwealth of Virginia Voice Information Processing Analysis

Process Review . . .

Kickoff Meeting.....	Set scope of study and review data collection requirements.
Data Submission.....	Develop analytical model, Cost and comparative groups.
On-Site Review.....	Review data submission, clarify and resolve questions and provide preliminary findings.
Management Presentation...	Executive presentation of quantitative comparative metrics and qualitative assessment.

Benchmark Methodology



Overview . . .

- ◆ The Voice Information Processing benchmark analyzed cost and workload data from 10/95 to 9/96.
- ◆ Network
 - The benchmark includes all of the virtual service provided by MCI for both outbound and inbound (800) traffic.
- ◆ Technologies
 - For this study Real Decisions analyzed seven Commonwealth of Virginia locations. They are DIT, DMV, VDOT, Virginia Tech and three DSS agency locations.

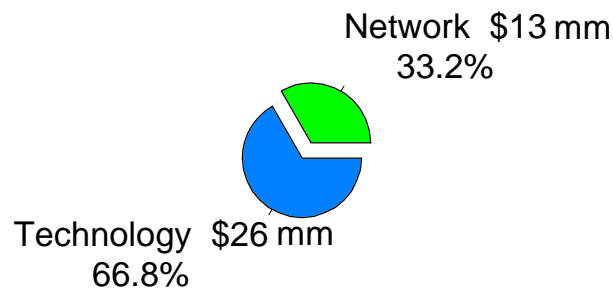
Commonwealth of Virginia Voice Information Processing Analysis

Key Issues. . .

- ◆ How do the Commonwealth of Virginia's network and Technology costs compare to the Real Decisions database?
- ◆ What opportunities exist to better utilize voice information technologies to gain a competitive advantage as a service provider to the agencies?
- ◆ Is the Commonwealth of Virginia positioned to provide competitive voice services and support which will retain the agency client base?

Commonwealth of Virginia Voice Information Processing Analysis

Network Services Voice Network



Estimated annual enterprise expenditure.

Commonwealth of Virginia Voice Information Processing Analysis

Definitions . . .

Average.....	The average of all companies in the current database.
Peer Group Average....	The average of all companies chosen for comparison in the current database that have a similar structure and service commitment to that of your company.
Industry Average.....	The average of all companies in the current database in the same industry as your company.

Commonwealth of Virginia Voice Information Processing Analysis

Definitions . . .

Total Cost.....	Consensus cost model for studied network elements and technologies.
Minutes	Traffic between a company's dedicated and switched locations and/or those locations and non-company sites.
Lines.....	Voice grade equivalent lines.
Sites - Network.....	Facilities with dedicated and/or switched network connections.
Personnel.....	Number of full-time equivalent people engaged in managing, operating and administering the network.

Commonwealth of Virginia Voice Information Processing Analysis

Definitions . . .

Outbound Network.....	This network is the combination of the private network and the virtual outbound network as defined above.
Overall Network.....	This network is the sum of the private, inbound and virtual networks as described above.
Transmission component....	The usage and access costs associated with the network being studied (for example, inbound 800).

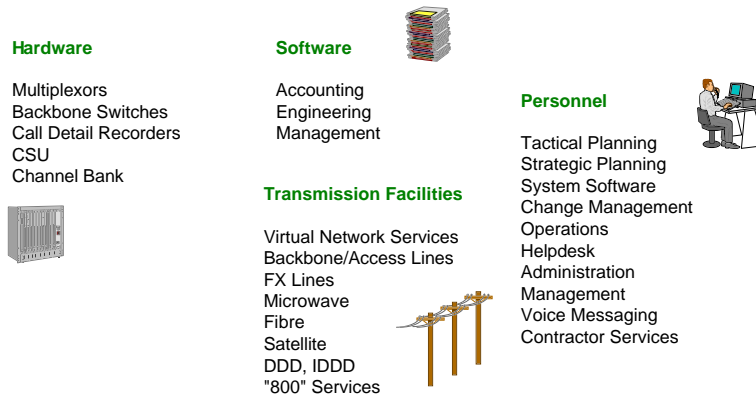
Commonwealth of Virginia Voice Information Processing Analysis

Definitions . . .

Virtual.....	This is the outbound, non-internal, switched network as defined by your tariff agreement with the common carrier. It includes all usage and access circuit costs.
Internal Network.....	This is the private network with all its associated hardware and circuit costs and minutes of usage.
Inbound or 800 Network.....	This is the inbound service (800) as provided by the common carrier. It includes all usage and access circuit costs.

Commonwealth of Virginia Voice Information Processing Analysis

Consensus Cost Model



Commonwealth of Virginia Voice Information Processing Analysis

Study Parameters . . .

- ◆ During the study period the Commonwealth of Virginia generated more than 140 million minutes of voice traffic which was supported by MCI and Bell Atlantic.
- ◆ The total expenditure in support of the voice traffic was \$12.9 million dollars.
- ◆ The Commonwealth employed 18.2 full time equivalents to manage, plan and administer the voice network.
- ◆ There was a small amount of traffic carried by other Local Exchange Carriers (LEC) which was excluded since the data was not available in the format needed for comparison to the database.

Commonwealth of Virginia Voice Information Processing Analysis

Study Parameters . . .

	Annual Call Minutes (000's)	Consensus Budget (000's)	Personnel
COMMVA	141,873	\$12,945	18.15
PEER	119,876	\$12,271	3.21
VRT	83,247	\$8,596	2.67

Commonwealth of Virginia Voice Information Processing Analysis

Peer Group Selection . . .

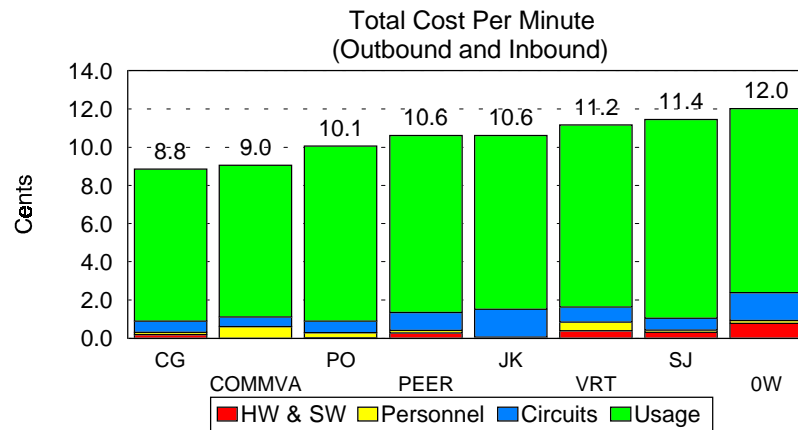
- ◆ Key criteria used for selection of peer group:
 - Network Technology (ETN, Virtual or Hybrid)
 - Traffic distribution
 - Call Volumes
 - Topology

Commonwealth of Virginia
Voice Information Processing Analysis

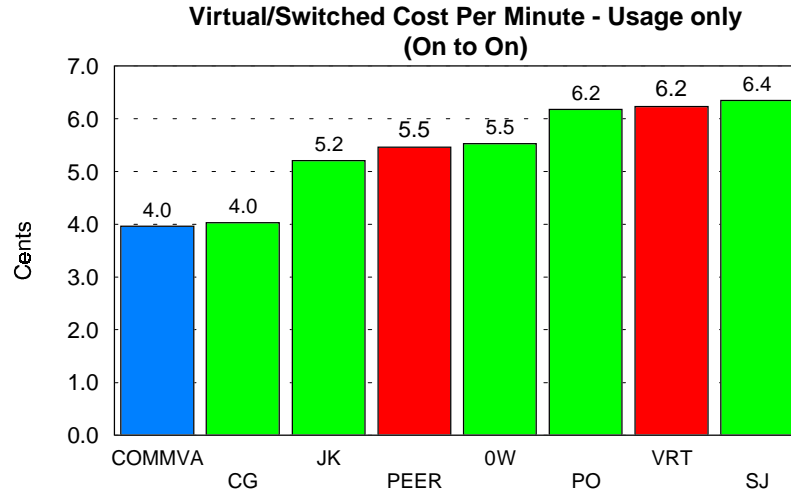
Cost Per Minute metrics . . .

	Virtual / Switched	"800"
COMMVA	\$0.082	\$0.096
PEER	\$0.096	\$0.108
VRT	\$0.100	\$0.109

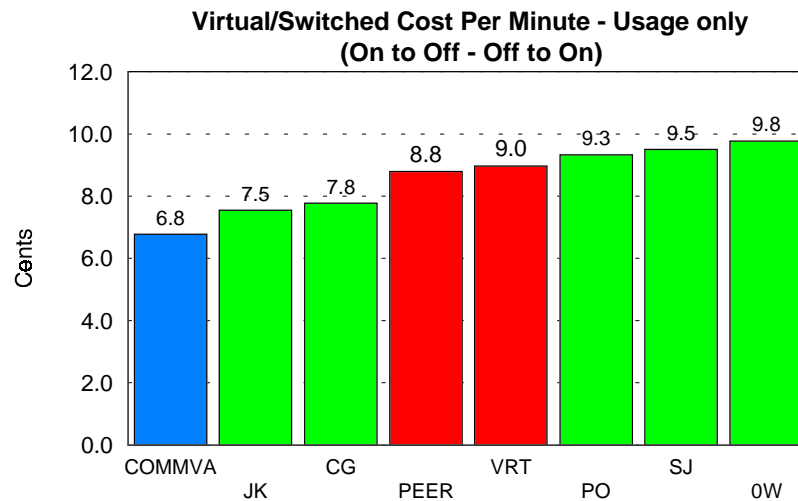
Commonwealth of Virginia
Voice Information Processing Analysis



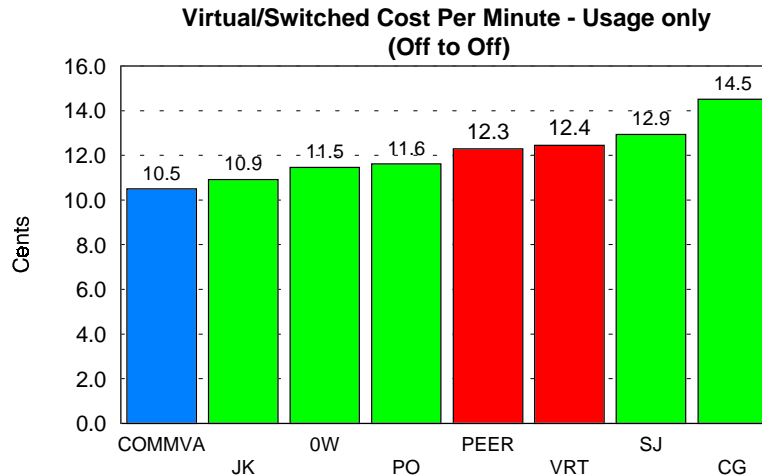
Commonwealth of Virginia
Voice Information Processing Analysis



Commonwealth of Virginia
Voice Information Processing Analysis



Commonwealth of Virginia Voice Information Processing Analysis



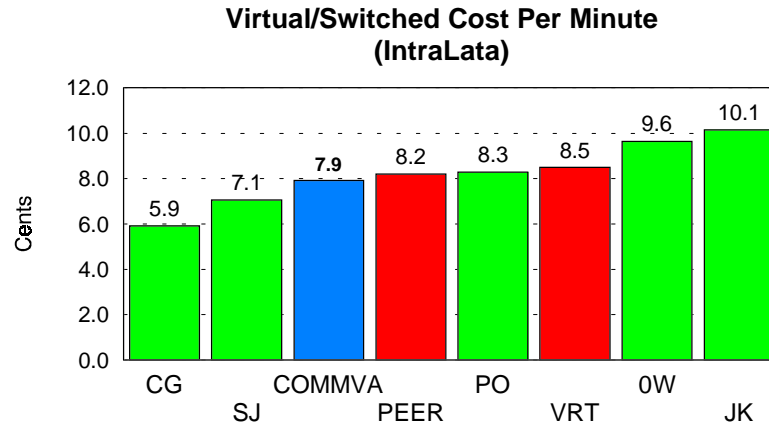
Commonwealth of Virginia Voice Information Processing Analysis

Virtual usage cost per minute metrics. . .

	"A" RATE ON-ON	"B" RATE ON-OFF	"C" RATE OFF-OFF	800 - DED'CTD	800 SWITCHED
COMMVA	\$0.040	\$0.068	\$0.105	\$0.079	\$0.108
Peer	\$0.055	\$0.088	\$0.123	\$0.094	\$0.139
JK	\$0.052	\$0.075	\$0.109	\$0.096	\$0.141
OW	\$0.055	\$0.098	\$0.115	\$0.103	\$0.166
SJ	\$0.064	\$0.095	\$0.129	\$0.099	\$0.135
CG	\$0.040	\$0.078	\$0.145	\$0.083	\$0.114
PO	\$0.062	\$0.093	\$0.116	\$0.088	\$0.137

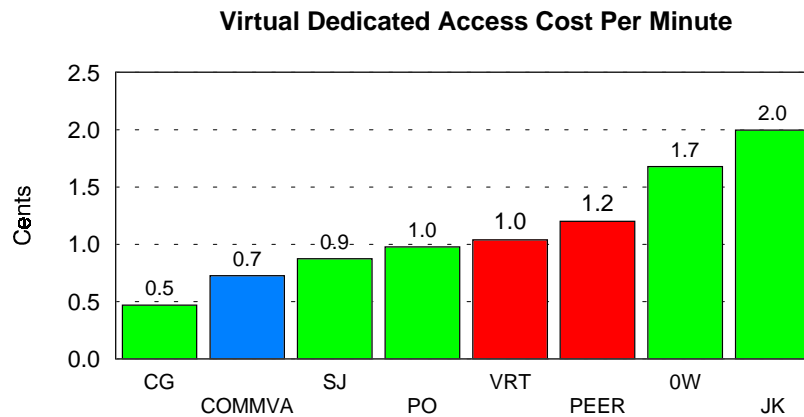
The Commonwealth of Virginia has achieved virtual usage rates which are in the top 10% of the database for outbound A, B and C rates as well as inbound (800) calling categories.

Commonwealth of Virginia
Voice Information Processing Analysis

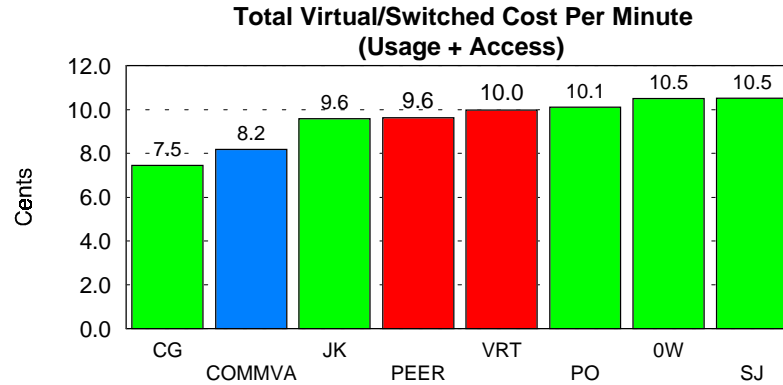


Bell Atlantic is providing intralata service for the Commonwealth of Virginia. Best in Class intralata rates are between 3.5 and 4.5 cents.

Commonwealth of Virginia
Voice Information Processing Analysis

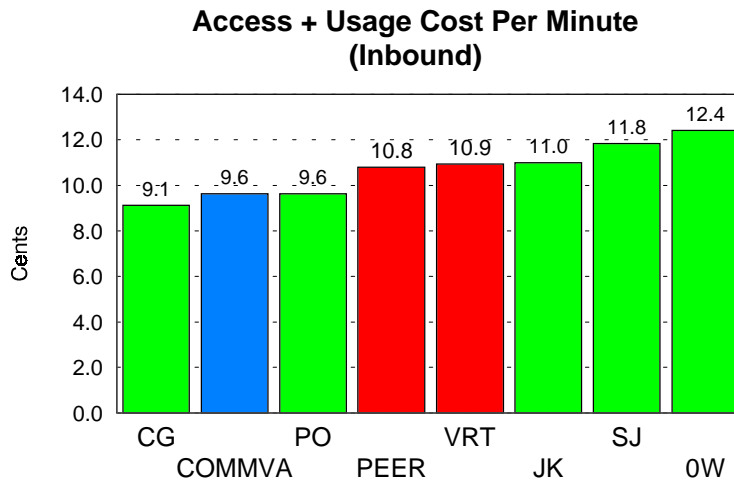


Commonwealth of Virginia Voice Information Processing Analysis



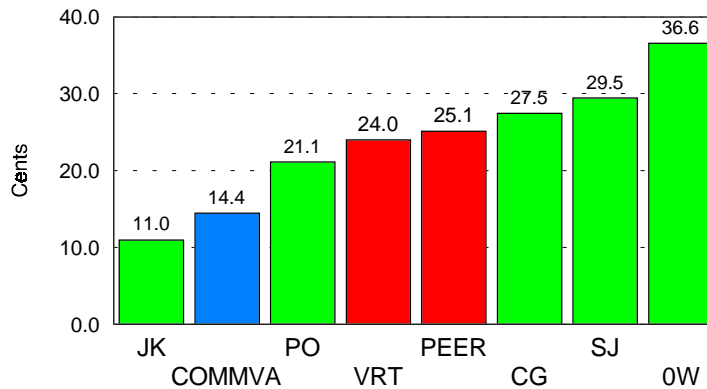
The combination of CG's lower access CPM and lower intralata CPM drives their outbound composite CPM below the Commonwealth of Virginia's.

Commonwealth of Virginia Voice Information Processing Analysis



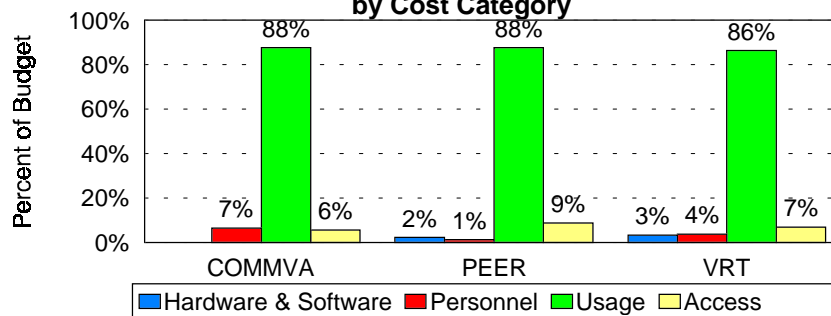
Commonwealth of Virginia
Voice Information Processing Analysis

Credit Card Cost Per Minute



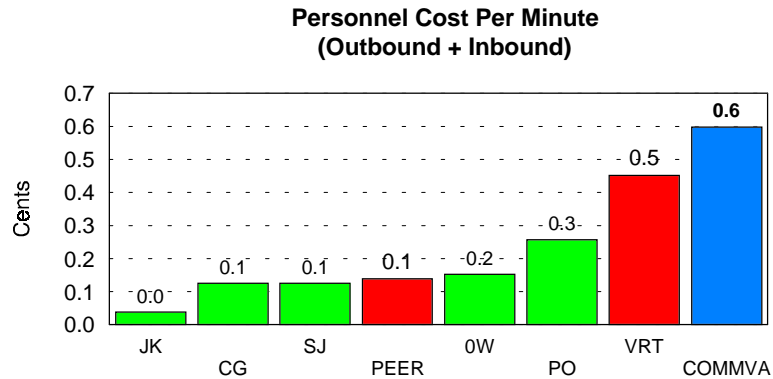
Commonwealth of Virginia
Voice Information Processing Analysis

**Cost Distribution
 by Cost Category**



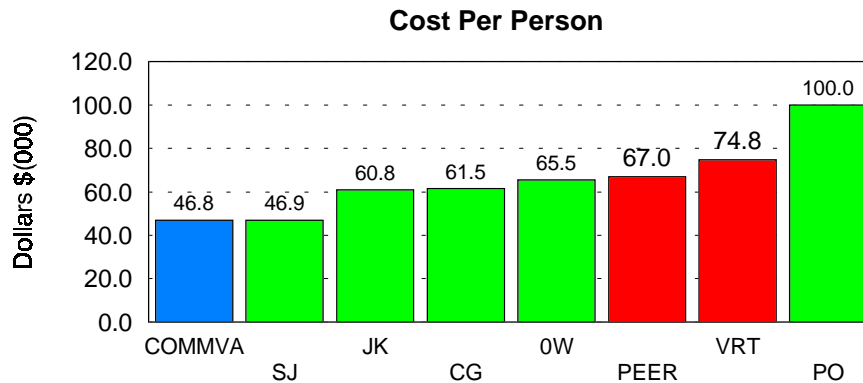
The percentage of cost supporting personnel is twice that of the database and four to five time that of the peer. There isn't any hardware cost for two reasons. Hardware supporting the network is minimal in nature and much of it resides at the individual agencies for which data was not available.

Commonwealth of Virginia Voice Information Processing Analysis

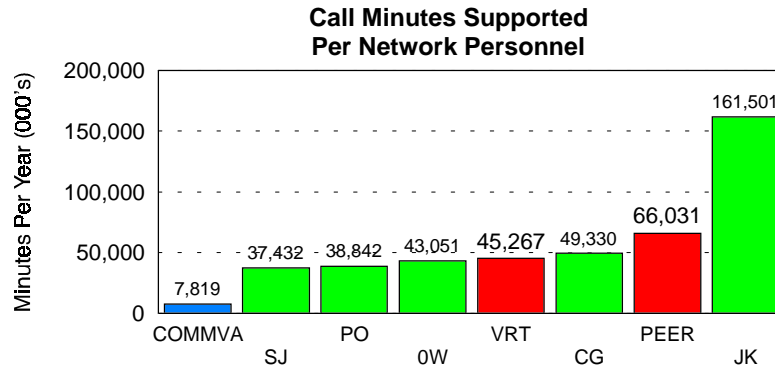


Total personnel expenditure during the study period for the Commonwealth was slightly under \$1 million.

Commonwealth of Virginia Voice Information Processing Analysis

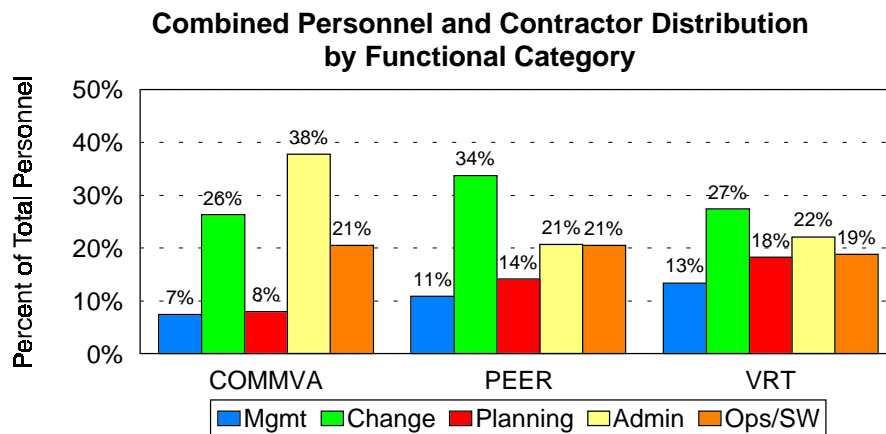


Commonwealth of Virginia Voice Information Processing Analysis

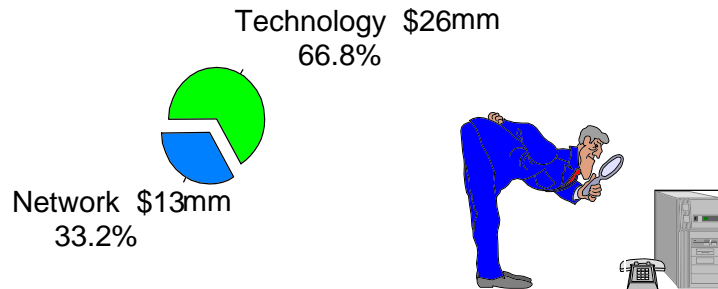


Organizations utilizing a virtual network have adopted a "manage the vendor" profile.

Commonwealth of Virginia Voice Information Processing Analysis



Network Services - Voice Technology



Definitions ...

- Total Cost.....** Consensus Budget for studied network elements
- Extensions.....** Line on a PBX, central office service or key system
- Changes.....** Physical or logical (i.e., software) moves, adds or changes made to the PBX, central office service or key system (MAC)
- Personnel.....** Number of full-time equivalent people engaged in managing, operating and administering the network. Technologies Basic Services (PBX, central office and key systems). ACD, voice mail, voice response, facsimile and video or teleconferencing

Commonwealth of Virginia Voice Information Processing Analysis

Consensus Cost Model

Hardware



Central office services
PBX (depreciation, lease, maintenance)
Handsets
Automatic Call Distributors
Voice Mail
Voice Response
Facsimile
Video and Teleconferencing

Facilities



Central office lines

Software



Least cost routing
Voice Mail, Voice Response
Local Directory
ACD

Personnel



Management
Strategic Planning
Tactical Planning
Change Management (MAC)
Administration
Voice Mail Administration
Operations
Contractor Services

Commonwealth of Virginia Voice Information Processing Analysis

Peer Group Selection . . .

- ◆ Key criteria used for selection of peer group
 - Technology (PBX, Centrex)
 - Site Size (Extensions)
 - Level of control (Centralized vs Decentralized)
 - Monthly Rate of Change (MAC activity)
- ◆ Three comparison groups selected representing size ranges:
 - PBX1 - <1000 extensions
 - PBX2 - 1000 - 4000 extensions
 - PBX3 - > 4000 extensions
 - CTX - Organizations employing Centrex service

Commonwealth of Virginia Voice Information Processing Analysis

Study Parameters . . . Technologies

- ◆ The benchmark consists of specific sites selected from four agencies and two universities for comparison to the database.
- ◆ The Commonwealth has a large Centrex environment which most agencies studied utilize. Virginia Tech utilizes a PBX to serve their user base.
- ◆ The major cost components of the study are hardware, maintenance, voice mail, local trunks, Centrex links, local usage and support. The major workload components are extensions, mailboxes and move, add and change activity (MAC).

Commonwealth of Virginia Voice Information Processing Analysis

Study Parameters . . . Technologies

- ◆ Participating agencies were contacted and relied upon for most of the data and data refinement for the voice technologies benchmark.
- ◆ JMU participated in the initial data collection process but further refinement of the data was not available therefor they are not included in the report.
- ◆ DIT expensed telephone sets during the study period. For purposes of this study the sets were amortized over a five year period.

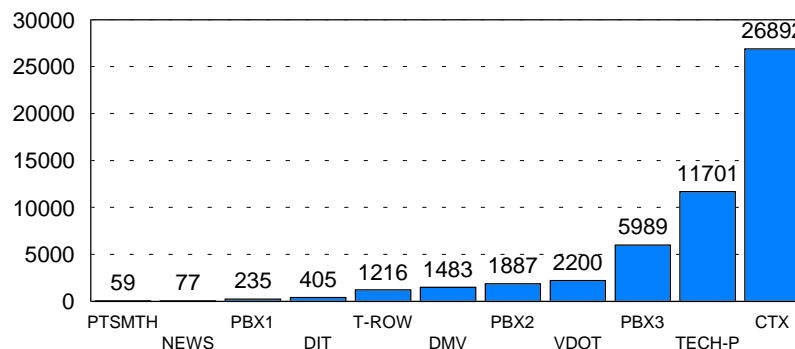
Commonwealth of Virginia Voice Information Processing Analysis

Study Parameters . . . Technologies

- ◆ MAC data was gathered using summary reporting systems. Extension and agency distributions were used to allocate and estimate cost and workload activity.
- ◆ MAC costs included in the study are Bell Atlantic's MACSTAR charges, DIT personnel, agency personnel, local exchange carrier charges and adhoc time and materials charges.
- ◆ Many agencies were in the process of upgrading to ISDN facilities during the study period.

Commonwealth of Virginia Voice Information Processing Analysis

Site Sizes in Extensions
Sites and Database Averages



The CTX extension average represents the average purchasing power of the organizations utilizing Centrex service.

Commonwealth of Virginia Voice Information Processing Analysis

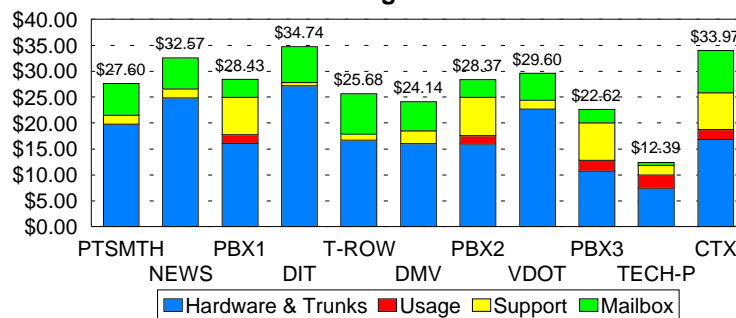
Comparative metrics . . . Cost per extension

	Basic Service	Voice Mailbox	Total
PTSMTH	\$21.49	\$6.10	\$27.60
NEWS	\$26.55	\$6.02	\$32.57
PBX1	\$24.67	\$3.48	\$28.14
DIT	\$27.79	\$6.95	\$34.74
T-ROW	\$17.87	\$7.81	\$25.68
DMV	\$18.45	\$5.69	\$24.14
PBX2	\$24.98	\$3.39	\$28.37
VDOT	\$24.45	\$5.15	\$29.60
PBX3	\$19.80	\$2.59	\$22.39
TECH-P	\$11.86	\$0.53	\$12.39
CTX	\$24.89	\$8.11	\$33.00

The cost for voice mail is comprised of both the service provider charge and Virginia's administrative costs.

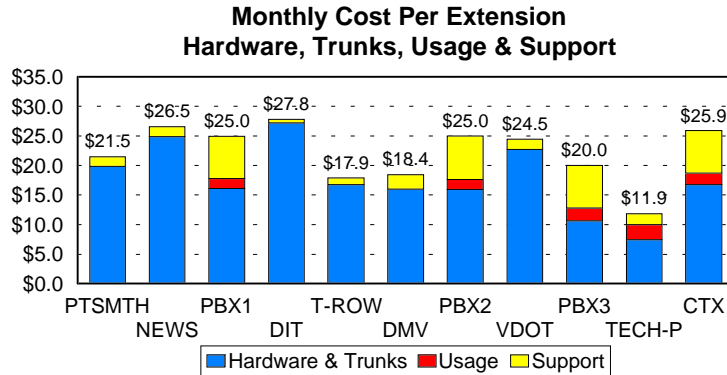
Commonwealth of Virginia Voice Information Processing Analysis

Monthly Cost Per Extension
Including Voice Mail



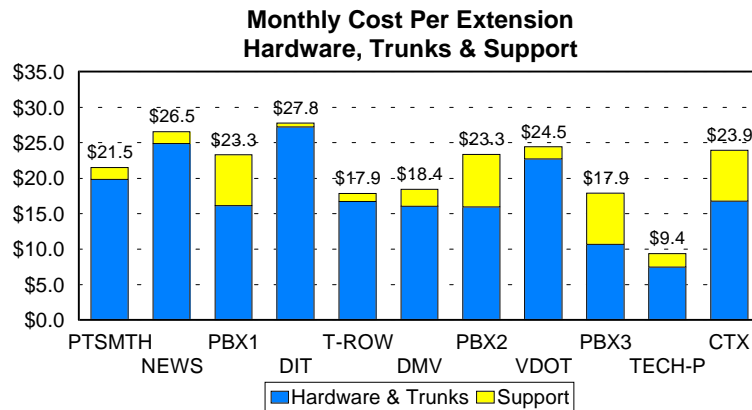
Virginia Tech has integrated voice mail system which is being operated at a cost significantly lower than the Optimail and Hello, Inc. voice mail services.

Commonwealth of Virginia Voice Information Processing Analysis



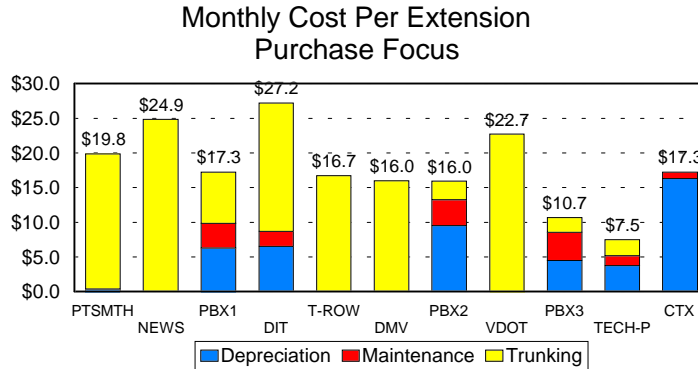
The Commonwealth of Virginia is predominantly served by flat rate service and does not incur local usage charges.

Commonwealth of Virginia Voice Information Processing Analysis



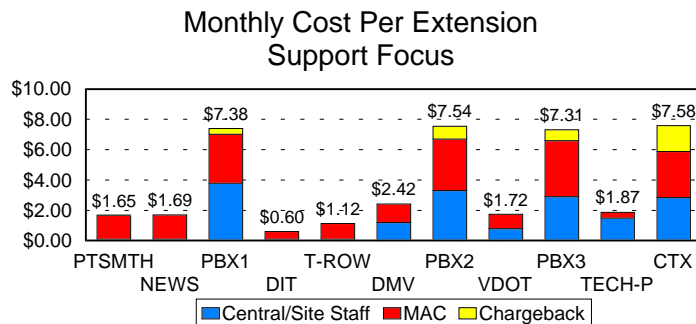
The Commonwealth enterprise consists of approximately 125,000 extensions of which 65,000 are Centrex.

Commonwealth of Virginia Voice Information Processing Analysis



Bell Atlantic's retail message rate Centrex price in the (804)-371 exchange is \$18.65 per line inclusive of features. Flat rate Centrex is \$34.17.

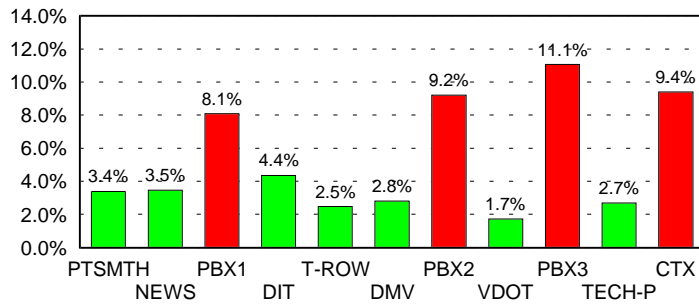
Commonwealth of Virginia Voice Information Processing Analysis



The support costs include the central DIT staff and agency specific personnel in place to support premise based technologies. DIT central staff costs are driven down by the large user base of 125,000 extensions.

Commonwealth of Virginia Voice Information Processing Analysis

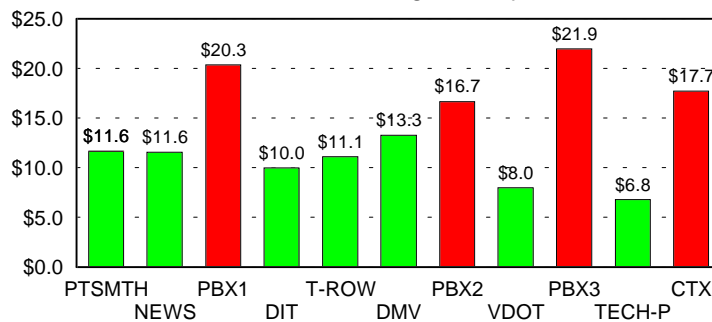
Monthly Rate of Change



Virginia's rate of change is consistently below the averages.

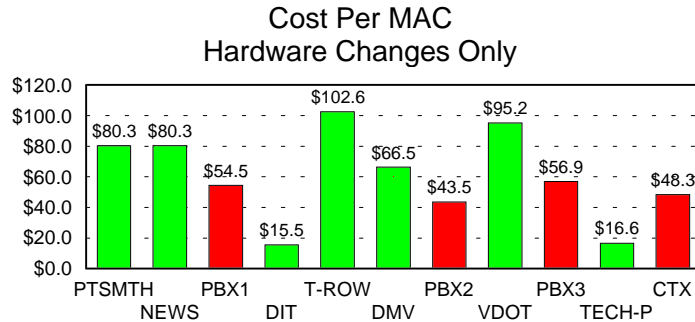
Commonwealth of Virginia Voice Information Processing Analysis

Cost Per MAC
Software Changes Only



The MACSTAR charges are included in the software calculations.

Commonwealth of Virginia Voice Information Processing Analysis



Adhoc time and material cost and summary level data contribute to the variances in hardware cost per change.

Commonwealth of Virginia Voice Information Processing Analysis

Observations . . .

- ◆ Virginia's overall network cost per minute is 15% below the peer group.
- ◆ In all except intralata The Commonwealth has achieved virtual usage rates that are in the top 10% of the Real Decisions database.
- ◆ The Commonwealth is managing the network with a staff six to seven times that of the database and peer group.
- ◆ The Commonwealth of Virginia was able to obtain and report on all voice network data with relative ease and a high degree of confidence.

Commonwealth of Virginia Voice Information Processing Analysis

Observations . . .

- ◆ The Commonwealth of Virginia's overall Centrex cost per extension with and without voice mail is at or below the database average.
- ◆ The Commonwealth is leveraging Centrex nodes for access to the virtual network.
- ◆ The PBX studied exhibited cost a structure that was considerably less than the comparable Real Decisions averages.

Commonwealth of Virginia Voice Information Processing Analysis

Observations . . .

- ◆ The rate of change experienced within the Commonwealth's environment is half or less than that of the database.
- ◆ The cost per software change is reasonably consistent from site to site while the cost per hardware change varies greatly.
- ◆ The Centrex cost was easily obtained and verified but much of the MAC activity and associated costs were available only at an agency summary level. Site specific activity had to be estimated and allocated by percent distributions.

Strategies for Improved Performance

Strategies for Improved Performance

- ◆ Issue: Virginia has obtained "Best in Class" network rates from MCI but is receiving intralata rates at the database average.
- ◆ Strategy: Continually monitor virtual rates and exploit the current deregulation of telecommunication services.
- ◆ First Step: Research alternative providers of intralata services and prepare an RFP. Consider all options including driving Centrex vendors to provide Centrex Extend services.
- ◆ Goal: Obtain "Best in Class" rates for all network services.

Commonwealth of Virginia Voice Information Processing Analysis

Strategies for Improved Performance

- ◆ Issue: The Commonwealth of Virginia has a Centrex rate that is in line with the database but is not achieving a "Best in Class" rate.
- ◆ Strategy: Engage in a competitive bid process for premise based services. Investigate the possibility of employing alternative service providers.
- ◆ First Step: Determine the needs of the Commonwealth and submit an RFP to vendors
- ◆ Goal: Leverage purchasing power of the entire Commonwealth to achieve the best possible service and rate from providers while aligning technology development with the needs of the agencies.

Commonwealth of Virginia Voice Information Processing Analysis

Strategies for Improved Performance

- ◆ There are specific practices and procedure that will allow clients to target "Best in Class" results.
- ◆ Along with the negotiation of rates, "Best in Class" groups are also insisting on contract language that will provide the greatest flexibility and benefit to their organization. The only guarantees that will occur are those that stem from the "T&Cs" that are in the contract.

RFP "Best Practices"

- ◆ Assess the enterprise business plan
- ◆ Audit network services contracts and make co-terminus
- ◆ Develop a network services provider strategy
- ◆ Aggregate all applicable services
- ◆ Establish desired SLAs
- ◆ Prepare for an RFP - create selection criteria
- ◆ Identify targeted network services prices, terms and conditions
- ◆ Competitive multiple vendor bid process
- ◆ Assess impact on staff and implement

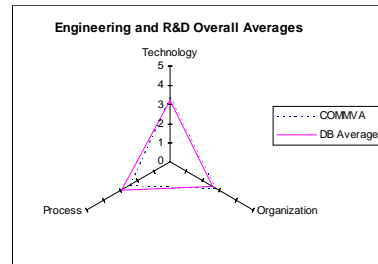
Contract Negotiation "Best Practices"

- ◆ Waiver of non-disclosure
- ◆ Benchmarking
- ◆ Pass-on of carrier's rate reduction
- ◆ Guaranteed conversion to newer services and technologies
- ◆ Open renegotiation based on market prices
- ◆ Use of tariffs for downward pricing
- ◆ Right to terminate
- ◆ "Fresh look" clause
- ◆ Guaranteed "buy back" of obsolete technology
- ◆ Maximum contract term not to exceed 3 years

Commonwealth of Virginia Voice Information Processing Analysis

Strategies for Improved Performance

- ◆ Issue: Virginia has an informal process and organization in place to meet technology R & D needs.
- ◆ Strategy: Continually evaluate the skill sets Virginia needs to provide and manage existing and emerging telecommunication technologies to the end users.
- ◆ First Steps: Formalize technology R & D and assess the needs of the agencies.
- ◆ Goal: Fully utilize Virginia's resources and align technology strategy with agency needs.



Engineering and R&D Overall Averages		
TOP	COMMVA	DB Average
Technology	3.3	3.2
Organization	2.8	2.6
Process	2.4	2.9

Commonwealth of Virginia Voice Information Processing Analysis

Strategies for Improved Performance

- ◆ Issue: The Commonwealth is utilizing vendors to provide voice network and technology services and maintains an organization of 18 FTEs when the peer is utilizing fewer than 4 FTEs.
- ◆ Strategy: Adopt a "manage the vendor" profile.
- ◆ First Step: Evaluate and further leverage the vendor resources available to provide support to The Commonwealth.
- ◆ Goal: Maintain an organization which is aligned with the services being provided.

Thanks!

